



# AMERICAN MILITARY TRANSPORT AIRCRAFT

*Since 1925*



**E. R. JOHNSON**

*Drawings by* LLOYD S. JONES

American Military  
Transport Aircraft  
Since 1925

ALSO BY E.R. JOHNSON  
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*Drawings by Lloyd S. Jones*



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or by any means, electronic or mechanical, including photocopying  
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On the cover: (top) front-view of the Boeing (McDonnell Douglas)  
C-17A Globemaster III; (center) side-view a of Douglas C-47A of  
the 80th Troop Carrier Squadron; (bottom left) plan-view of the Douglas C-1;  
(bottom right) plan-view of the Lockheed C-130H Hercules  
(Illustrations by Lloyd S. Jones)

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To two good friends and former Curtiss C-46 Commando pilots  
who now reside in Mountain Home, Arkansas:

First Lieutenant Edward D. Michalek,  
USAFR, 437th Troop Carrier Wing, 315th Air Division,  
Tactical Air Command, Brady Air Base,  
Fukuoka, Japan, Korean War, 1950–1952,  
and

First Lieutenant Roy E. Danuser,  
USAAF, 1337th Base Unit, 29th Transport Group, India-China Division,  
Air Transport Command, Sookerating Airfield,  
Assam, India, World War II, 1944–1945.

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# Preface

Without airlift support, the modern American military machine would come to a screeching halt. Since World War II, beginning with the Cold War and continuing with the War on Terrorism up to present day, the U.S. armed forces have come to increasingly rely upon airlift for mobility. The power to rapidly move and thereafter support a military operation, anywhere at any time, has become an indispensable element of American defense strategy. This work is intended to provide the reader with a concise historical survey, including technical specifications, drawings, and photographs, of the various types of fixed-wing military aircraft used over an 86-year period to carry out the airlift mission.

For purposes of organization, the book is divided into three chronological segments: Series I—1925 to 1962, further sub-divided by Part A, USAAC, USAAF, USAF, and U.S. Army Aircraft, and Part B, USN, USMC, and USCG Aircraft; Series II—1962 to Present; and Series III—Utility and Miscellaneous Transports Since 1962. The main three aircraft series are preceded by a historical overview “The Emergence of American Military Airlift,” which summarizes how the various services have organized and developed their respective airlift missions from earliest times up to present. In standard military terminology, these missions typically fall into the following broad categories:

**Strategic Airlift.** Various referred to as “long-range logistical support,” strategic airlift pertains to employment of aircraft having the ability—in terms of range and payload—to move weapons, military materiel, and/or personnel from base to base over transcontinental and transoceanic distances.

Since World War II, the design of aircraft specialized for the strategic airlift role has produced a succession of airframes large enough to accommodate outsized cargos such as heavy engineering equipment, large vehicles and tanks, artillery, aircraft components, troop-carrying helicopters, and missile systems (e.g., Boeing C-97, Douglas C-124 and C-133, Lockheed C-141 and C-5, and McDonnell Douglas/Boeing C-17).

**Tactical Airlift.** Known initially as “troop carrier” units, tactical airlift pertains to types of aircraft designed to provide direct logistical support to military units within a theater of operations. Such aircraft generally have the ability to land and take off on short, unprepared airstrips and can be configured to airdrop supplies and paratroopers. In recent times, tactical transports have been subdivided between larger, “inter-theater” types (e.g., Fairchild C-119 and Lockheed C-130), which operate between aerial ports and forward bases, and smaller, “intra-theater” types (e.g., De Havilland C-7 and Short C-23), which can operate much closer to the forward edge of the battle area (FEBA). Large helicopters like the Boeing CH-47 are also used in the intra-

theater tactical role but suffer from limited range and high operating costs compared to fixed-wing transports.

**Aeromedical Airlift.** Evacuation of wounded personnel from combat zones became one of the very first airlift missions, initially with training and observation aircraft modified to serve as air ambulances, and when the first true transports began joining the military inventory in the mid-1920s, they were adapted to carry medical litters and attendants. During World War II, nearly all of the principal transport types (e.g., Douglas C-47 [R4D; naval designations appear in brackets], Curtiss C-46 [R5C], and Douglas C-54 [R5D]) could be configured to perform the aeromedical role. Whether a given mission was strategic or tactical depended upon the size and range of the transport used. Aircraft specifically designed for aeromedical airlift began entering service soon after the Korean War (e.g., Convair C-131 in 1954 and the Douglas C-9 in 1968); however, since the late 1990s, emphasis has returned to converting standard strategic and tactical transports (e.g., Boeing C-17 and Lockheed C-130) to the aeromedical role.

**Staff and Very Important Person (VIP) Airlift.** One of the most profound effects of aircraft on military operations has been their ability to dramatically shorten the lines of communication. Following World War I, moving staff officers, planners, and couriers from command to command by air became an indispensable ingredient of the Army, Navy, and Marine Corps operations. Early on, a mix of aircraft — trainers, observation, and bombers — were used until the military services began procuring multi-engine commercial transports (e.g., Fokker C-2 [RA] and Ford C-3 [JR]) during the mid- and late 1920s. Over the years, all types of transports, large and small, have been used to fulfill the staff airlift role, from the long-range, VIP-configured airliner types of the Presidential Flight (e.g., Douglas VC-54 and VC-118, Lockheed VC-121, and Boeing VC-137 and VC-25) to light transports operating at medium and short ranges between bases (e.g., Beech UC-45 [JRB], Cessna U-3, and Gates/Learjet C-21).

**Utility Airlift.** Comprising the broadest and most general category, utility airlift fills an important niche between the other transport functions. Insofar as the term utility means “being useful,” its application to military airlift has led to procurement of a diverse assortment of aircraft, ranging from two-place lightplanes (e.g., Luscombe UC-90) to single and multi-engine amphibians (e.g., Grumman J2F [OA-12; USAF designations in brackets] and UF [HU-16], and more recently, turboprop and jet-powered adaptations of business aircraft (e.g., Beech U-21, Pilatus U-28, and Cessna UC-45). Some utility transports have functioned in mostly a tactical role, moving troops, carrying light cargos, and evacuating wounded, while others have been used to shuttle personnel and freight between widely dispersed bases, both in the continental United States and overseas.

# Introduction: The Emergence of American Military Airlift

## Prewar Era —1925 to 1940

**Army Air Service and Air Corps.** As the first dedicated transport aircraft (e.g., Douglas C-1, Fokker C-2, and Ford C-3) began entering Army service during the mid- and late 1920s, the concept of military airlift — using aircraft to move supplies, weapons, equipment, and personnel — was virtually untested. Early on, the Army's variegated mix of single and multi-engine transport aircraft were distributed among 17 different air bases with no scheme of central organization. Endeavors to improve effectiveness led to formation of the 1st Air Transport Group (Provisional) in late 1932, with one air transport squadron assigned to each of four strategically located air depots for the purpose of moving aircraft engines, spares, and related equipment to various air bases. During periodic Army maneuvers, the new transport squadrons also used their aircraft to evaluate the viability of tactical airlift in the field — i.e., re-supply, medical evacuation, and troop movement. These modest beginnings became the genesis of a process that ultimately resulted in the massive buildups of Air Transport and Troop Carrier Commands during the wartime era.

Following the Air Corps' ill-fated efforts in carrying the mail from February to June 1934 (i.e., 66 accidents and 12 fatalities) a special board chaired by Secretary of War Newton Baker recommended that the service should in the future procure state-of-the-art, twin-engine civil transports (e.g., Boeing 247 and Douglas DC-2) rather than single-engine types designed to military specifications (e.g., Kreider-Reisner C-31), which, in 1935 and 1936, generated orders for 21 DC-2s (as the C-32, -33, and -34). Airlift organization was further bolstered by the creation of the 10th Air Transport Group and four more squadrons in 1937, followed in 1938 by procurement of 35 C-39s, a DC-2/-3 hybrid featuring a reinforced floor, double cargo doors, and an internal hoist; however, due to the official Air Corps bias in favor of combat aircraft, acquisition of new transports remained a low priority, to the extent that by mid-1939, of approximately 1,700 aircraft on hand, only 75 were dedicated transports.

**Navy, Marine Corps, and Coast Guard.** In terms of quantity, most of the Navy aircraft reported during this era were either single-engine utility amphibians (e.g., Grumman JF/J2F) that functioned in a ship-to-shore role, or twin-engine utility amphibians (e.g., Sikorsky RS and JRS, Douglas RD, and Grumman JRF) that carried light cargos, staff, and personnel around coastal and island bases. Amphibians were typically assigned to utility squadrons (VJ) or to



headquarters at various naval installations. The Navy also utilized small numbers of off-the-shelf civil landplanes (e.g., Lockheed RO and R2O, Kinner RK, and Beech JB) as fast staff transports between administrative districts and foreign embassies. Since auxiliary vessels adequately served the logistical needs of the fleet, the few large commercial airliner types procured during this era (e.g., Ford RR, Douglas R2D, and Lockheed R5O) saw use primarily as VIP transports for headquarters staff. The first true Navy transport squadrons (VR) were not created until the last days of 1941.

The Marines began using multi-engine transport aircraft (e.g. Fokker RA and Ford RR) in what might be termed a tactical airlift role as early as 1927. The transports were all assigned to Utility Squadron Six (VJ-6M) to support combat operations of the Marine Second Brigade in Nicaragua. Likewise, in the mid- and late 1930s, VJ-6M and -7M (became VMJ-1 and -2, respectively) employed their small force of two Curtiss R4Cs and two Douglas R2Ds as tactical transports during military maneuvers. Four Douglas R3D-2s, delivered in late 1940 with reinforced floors and cargo doors, were split between VMJ-1 and -2 to train the first generation of Marine paratroops. Utility and headquarters squadrons and base air detachments (BAD) formed the primary transport element of Marine Air Groups until creation of the first dedicated Marine transport squadrons (VMR) during the middle of World War II.

Coast Guard utility amphibians procured during this era were used exclusively for law enforcement or search and rescue. In 1935 the Coast Guard began operating and maintaining VIP transports for the use of the Secretary of the Treasury (e.g., Northrop RT, Lockheed R3O, and Lockheed R5O) and also purchased small numbers of single-engine aircraft to be used as utility transports at various Coast Guard air stations (e.g., Stinson R3Q, Fairchild J2K, and Waco J2W).

## World War II Era—1941 to 1947

**Army Air Forces.** When the United States declared war on the Axis powers on December 8, 1941, the War Department was faced with the imminent prospect of supporting combat operations in five major theaters of war which were all great distances from the main sources of supply in the continental U.S. Although the airlift capacity of the U.S. Army Air Forces (AAF) grew exponentially during the war (i.e., from 254 transport aircraft in late 1941 to a peak of 10,500 by mid-1944), it did not displace land and sea transport as the primary means of moving the military forces and the vast tonnages of supplies needed for overseas offensive campaigns. Even in the China-Burma-India (CBI) Theater, the bulk of military material arrived by ship before being transshipped by air over the Himalaya Mountain Range (i.e., the “Hump”) into China.

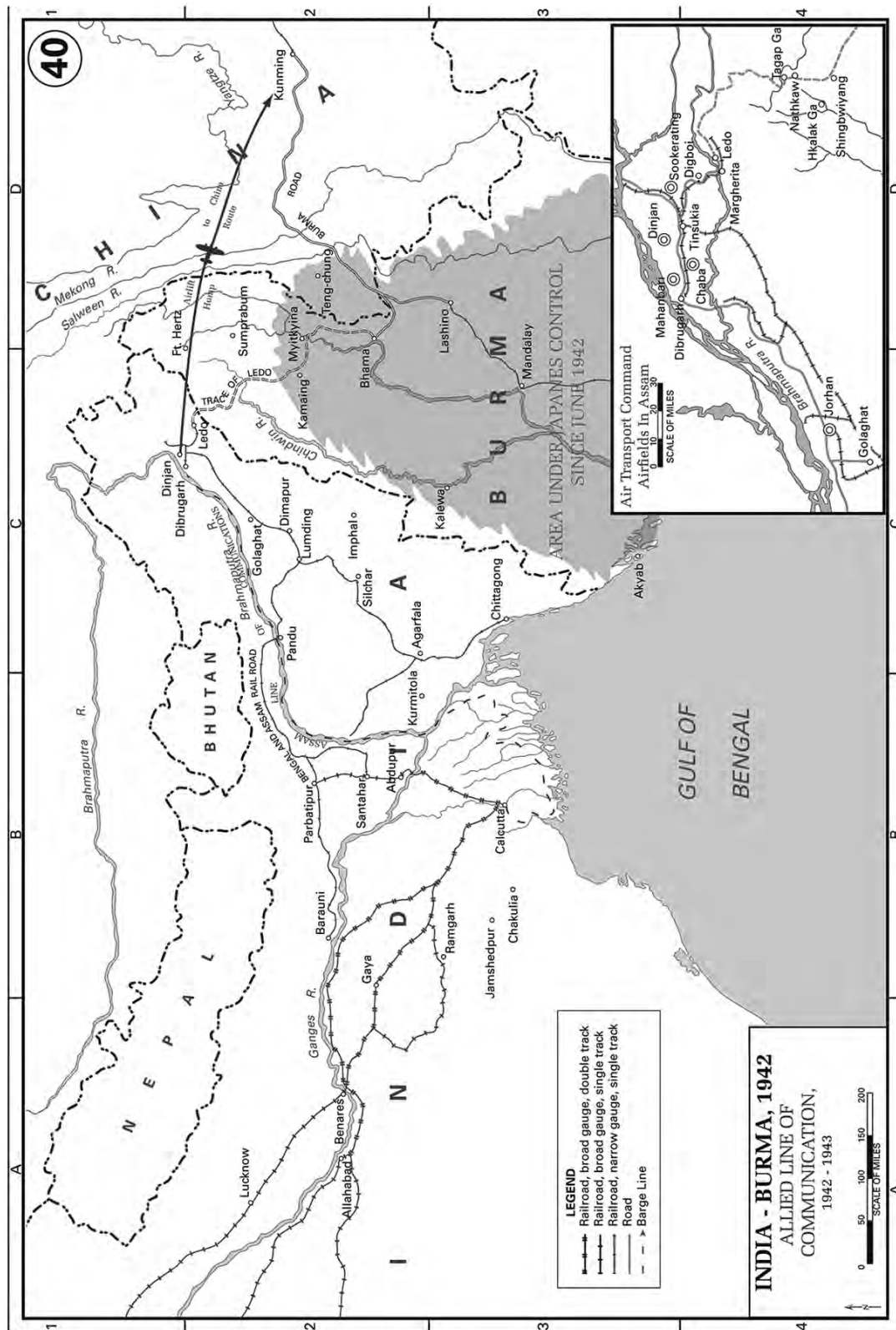
**STRATEGIC AIRLIFT.** Three important events set the stage for expansion of AAF long-range transport operations during the war: first, the creation of Air Corps Ferrying Command (ACFC) in May 1941 to deliver lend-leased aircraft manufactured in the U.S. to the Allies, principally Great Britain and its Commonwealth Nations, which in turn prompted development of regular routes across the North Atlantic, Mid-Atlantic, and South Atlantic (via South America and Africa); second, the formation of Air Service Command (ASC) in October 1941 to oversee expansion of maintenance facilities and supply depots, as well as coordinating contracts with civil air carriers; and third, the mobilization of the nation’s airlines in December 1941 under the effective control of ACFC. After ACFC became AAF Ferrying Command in May 1942, it was renamed again as Air Transport Command (ATC) in June 1942 under the leadership of Maj. Gen Harold L. George, as Commander, and Col. Cyrus R. Smith (former president of American Airlines),

as Deputy Commander. As organized, ATC was split between two main functions: Ferrying Division, responsible for delivering combat aircraft to overseas bases; and Air Transport Division, tasked with carrying high-priority cargos and personnel over long-range domestic and international routes.

ATC was headquartered in Cincinnati, Ohio, and starting in mid-1942, its air operations were subdivided into nine wings (later renamed divisions) by region: Alaskan (Alaska-Siberia route); Caribbean (U.S.-Central America-South America route); Central African (West Africa-Middle East-India route); European (Britain-Portugal/Spain-North Africa route); India-China (Assam [Northeast India]-China route); North Atlantic (Northeast U.S.-Northeast Canada-Greenland-Iceland-Scotland route); North African (West Africa-Morocco-Egypt-Italy route); Pacific (U.S. West Coast-Hawaii-Australia route, with Marshall and Marianna Islands and Philippines added later); and South Atlantic (South America-West Africa route). Though controlled by the AAF, ATC functioned as a quasi-military organization, drawing much of its early leadership from civilian airline executives directly commissioned as AAF officers. Airlines likewise provided experienced aircrews (pilots, navigators, and radio operators), aircraft maintenance facilities, and training bases. In the beginning, Air Transport Division's flight operations were necessarily dependent upon Douglas C-47s and the approximately 200 DC-3s impressed from the airlines, however, as deliveries of new aircraft gained momentum, they were replaced on longer routes by Curtiss C-46s, Douglas C-54s, and Consolidated C-87s.



Air Transport Command Douglas C-47B near the Great Pyramids of Egypt.



Over the course of the war, ATC developed a route structure that circled the globe and grew to become the largest air transport organization in the history of aviation. When hostilities finally ceased in September 1945, ATC was operating 3,386 aircraft, with a manpower roster of 41,520 officers, 166,026 enlisted personnel, and 23,753 civilian employees. During the huge military demobilization that followed V-J Day, ATC was reduced to a shadow of its former self and thought given to disbanding it altogether, with most of its aircraft either being sold surplus to airlines or placed in storage. Postwar opponents of ATC claimed that its role should be assumed by civil contract carriers; conversely, many senior ATC officials argued that the organization should be maintained as a national government-operated airline. When the U.S. Air Force became a separate service in September 1947, strategic airlift was not listed as one of its missions; however, leadership within the newly organized Department of Defense firmly believed that the military services needed long-range transport capability to deploy troops, supplies, weapons, and equipment to overseas bases, and their timely efforts ultimately led to the establishment of the Military Air Transport Service (MATS) in June 1948.

**TACTICAL AIRLIFT.** The rapid expansion of the AAF's tactical airlift organization during World War II was driven in large part by the concurrent build-up of Army Airborne forces. From one test platoon created in 1940, the Army ultimately raised five complete Airborne Divisions by the middle of 1943 (82nd, 101st, 11th, 17th, and 13th). In addition to the paratroops, the Airborne order of battle included a large fleet of assault gliders that would deliver light artillery, munitions, supplies, and supporting troops onto the battlefield. The task of conveying thousands of paratroopers and towing hundreds of gliders to their designated drop zones placed the AAF on a very steep learning curve. Initially, Air Service Command, with a nucleus of six Air Transport Groups (10th and 60th through 64th), acted as the support organization for paratrooper training and maneuvers. However, as transport operations grew, the AAF elevated the function to command level status, first as Air Transport Command in April 1942 (not to be confused with the ATC created in June 1942), then as I Troop Carrier Command (I TCC) in June 1942, with the primary mission of providing training and support within the continental U.S. A second element, XII Troop Carrier Command (XII TCC) was activated in November 1942, and a third, IX Troop Carrier Command (IX TCC), in October 1943, both to support forthcoming Airborne operations in the Mediterranean and European Theaters.

Each TCC was organized into two or three Troop Carrier Wings (TCW) and further subdivided into three to six Troop Carrier Groups (TCG) per wing. At full strength, a TCG typically consisted of 100 aircraft, 500 officers, and 1,300 enlisted personnel. Outside of XII TCC and IX TCC, a number of TCGs served under other commands in the Mediterranean, CBI, and Southwest Pacific Theaters. Besides carrying paratroops and towing gliders for Airborne assaults, TCGs also functioned as intra-theater tactical transports, providing medical evacuation and airlifting supplies, munitions, and personnel from staging areas to forward bases. Starting in 1944, in the CBI and Southwest Pacific, the AAF began forming Combat Cargo Groups (CCG) to be used purely as tactical transports. From 1942 onwards, Douglas C-47s and C-53s formed the basic aircraft complement of nearly all TCGs and CCGs, though one group in IX TCC did operate Curtiss C-46s late in the war, and some detached groups in the CBI and Southwest Pacific flew small numbers of Curtiss C-46s and Lockheed C-60s, plus B-17s and B-24s converted to carry cargo. During the course of the war, XII TCC and IX TCC participated in six major Airborne offensives (Operation Torch, November 1942; Operation Husky, July 1943; Operation Neptune, June 1944; Operation Dragoon, August 1944; Operation Market Garden, September 1944; and

***Opposite:*** Airlift route from India over the Himalayan Mountains (the “Hump”) into the interior of China.

Operation Varsity, March 1945) and TCGs attached to other commands supported Airborne assaults in Burma (March 1944) and the Philippines (February 1945).

At peak strength in late 1944, AAF tactical airlift operations consisted of 27 TCGs and 4 CCGs having an inventory of approximately 3,200 transport aircraft and a roster of 15,200 officers and 37,800 enlisted personnel. As part of the wide-ranging military cut-backs that followed the surrender of Japan in September 1945, the AAF disbanded I TCC and deactivated XII and IX TCC, then in March 1946, transferred all tactical airlift functions to the newly established Tactical Air Command (TAC). Nine of the existing TCGs were retained on active service, 15 moved to reserve or ANG status, and all others either disestablished or deactivated. TAC and its tactical airlift elements were absorbed into the newly independent U.S. Air Force in September 1947.

**Navy, Marine Corps, and Coast Guard.** As a practical matter, the Navy possessed no organic airlift capability at the time the United States entered World War II. Although it possessed sizeable numbers of auxiliary vessels to support fleet movements, faster means were needed to carry high value personnel and cargoes over long distances, and at some future point, tactical transports would be needed to support Marine Corps amphibious operations. On the Atlantic side, Allied shipping losses to German U-Boat attacks were reaching critical levels; and in the Pacific, the supply lines from the continental U.S. to territorial bases and potential combat zones stretched vast distances (e.g., West Coast to Hawaii, 2,500 miles; Hawaii to Australia, 5,100 miles).

**STRATEGIC AIRLIFT.** In mid-December 1941, the Navy Department created the Naval Air Transport Service (NATS)—on paper. In the months that followed, equipped with newly delivered Douglas R4Ds (AAF C-47) and modified Consolidated PB1Y and PB2Y and Martin PBM flying boats, three squadrons were formed: VR-1 at NAS Norfolk, Virginia for Atlantic operations; VR-2 at NAS Alameda, California for Pacific operations; and VR-3 at NAS Olathe, Kansas to form a nexus between supply centers and bases within the continental U.S. Airline personnel recalled to active duty formed the core of early aircrews, and like ATC, NATS contracted with the airlines to augment its expansion. American Airlines established a school in Ft. Worth, Texas to train new R4D pilots; Pan American Airways conducted a navigator training school at Coral Gables, Florida and also provided a seaplane transport service from San Francisco to Hawaii utilizing conscripted Martin M-130 and Boeing 314 (C-98) Clippers, along with Navy-supplied PB2Ys.

NATS grew slowly but progressively over the next two years, adding new aircraft like Douglas R5Ds (AAF C-54) to long-range routes and dividing its flight operations into four separate wings—West Coast, Atlantic, Alaska, and Caribbean. In late 1943, with the creation of Naval Air Ferry Command, NATS assumed responsibility for delivering new aircraft to Navy and Marine combat units, and by the end of the year, operational strength had grown to ten transport squadrons (VR) and three ferry squadrons (VRF). By the middle of 1945, NATS's operations had increased to 19 squadrons, including regular medical evacuation services of wounded Navy and Marine personnel from Guam to the U.S. Starting in early 1945, a Marine unit equipped with R5Ds, VMR-352, began flying strategic airlift missions between Hawaii and the Central Pacific Area. In addition to aircraft types previously mentioned, NATS also flew Lockheed R5Os (AAF C-60), converted Consolidated PB4Ys (AAF B-24) and RYs (AAF C-87), the sole Martin XPB2M, and Beech JRBs (AAF C-45). Navy plans to expand NATS even further, based upon the expected invasion of Japan, were abruptly foreclosed by the ending of the war in September 1945, resulting in cancellation of all outstanding aircraft contracts with the exception of six of the 20 Martin JRM flying boats ordered and the two Lockheed R6O/R6V prototypes still under construction. By the end of 1947, due to postwar downsizing, the NAS Olathe and NAS Miami





**NATS Martin PBM seen embarking passengers during World War II.**

operations had been terminated, and the NATS reduced to a fleet of 116 aircraft, and then in mid-1948, the Department of Defense disestablished NATS and merged it into the newly created Military Air Transport Service (MATS).

**TACTICAL AIRLIFT.** Except for staff transports attached to land-based commands, nearly all wartime tactical transports acquired by the Navy were directed to the Marine Corps. In December 1941, the Marines' entire tactical airlift force consisted of four Douglas R3D-2s in two utility squadrons (VMJ), but by the middle of 1943, the numbers had increased to 70 Douglas R4Ds (AAF C-47) serving within five VMJs and several Headquarters units. Three squadrons (VMJ-152, -153, and -253), identified as South Pacific Combat Air Transport Command, flew tactical airlift missions in direct support of combat operations in the Solomon Islands, Southwest Pacific Theater. From late 1943 to mid-1945, as Marine amphibious operations expanded in the South and Central Pacific Areas (e.g., Gilbert, Marshall, and Marianna Islands, plus Iwo Jima and Okinawa), its tactical airlift capability grew to seven squadrons (changed from VMJ to VMR in mid-1944) operating approximately 100 R4Ds, 100 Curtiss R5Cs (AAF C-46), and six Lockheed R5Os (AAF C-60). As a result of the post-World War II demobilization, all but three tactical airlift squadrons (VMR-152, -153, and -252) were either deactivated or disestablished.

During 1943 and 1944, eight Douglas R4Ds and ten Curtiss R5Cs were diverted to the Coast Guard from the Navy's transport allocation. The R4Ds, employed for both logistics support and offshore search and rescue patrols, were distributed among stations on both coasts, including the Gulf of Mexico and Alaska. All of the R5Cs were based at the USCG Supply Center at Elizabeth City, North Carolina to carry personnel, supplies, and equipment between Coast Guard bases in the continental U.S. and overseas. When the war ended and control of the Coast Guard was transferred back to the Treasury Department, the R4Ds and two of the R5Cs were retained in service.

## Postwar Era —1948 to 1965

**Reorganization of Armed Services.** The National Security and National Defense Acts, both signed into law in July 1947, initiated an across-the-board restructuring of the U.S. military establishment. Taken together, they merged the War (Army, including AAF) and Navy (including USMC) Departments into an overall Department of Defense (DOD) and established the U.S. Air Force (USAF) as a separate service. A policy statement issued by the Secretary of Defense in April 1948, popularly known as the “Key West Agreement,” defined the role of aviation within the respective services, namely: (1) the Navy would retain the strategic and tactical aircraft needed to support its operations at sea; (2) the Army would retain only aircraft and related aviation units needed for reconnaissance and medical evacuation; and (3) the USAF would control all other land-based strategic and tactical aircraft, including those generally used for logistical support of Army operations.

In the interval since the Key West Agreement, however, differences of opinion between the USAF and the Army over the missions of organic Army Aviation have fostered a series of inter-service agreements which, among other things, placed limits on the weight of both rotary and fixed-wing Army aircraft, specifically: The Bradley-Vandenberg Agreement of May 1949 restricted the empty weight of Army fixed-wing aircraft to 2,500 lbs. and helicopters to 4,000 lbs.; the Pace-Finletter Memorandum of Understanding of November 1952 raised the allowable empty weight of Army aircraft to 5,000 lbs. for both fixed-wing types and helicopters; and the Johnson-McConnell Agreement of April 1966 removed restrictions on the weight and armament of Army helicopters in exchange for the transfer of most of the Army’s intra-theater tactical transports (i.e., De Havilland CV-2/C-7 Caribous and CV-7/C-8 Buffalos) to USAF control. Even so, the Army-USAF rift with regard to fixed-wing, intra-theater tactical transports has persisted. In 1967 the Army purchased 140 Beech U-21s (King Air model 65-A90) that were used for intra-theater tactical support in Vietnam, then from 1988 to 1994, acquired 46 Short C-23s (model SD330) for similar purposes. As recently as 2009, under the aegis of the Joint Cargo Aircraft (JCA) program, Army efforts to procure 54 Alenia C-27s were frustrated when DOD trimmed down the number of aircraft ordered and gave control of them to the USAF.

**U.S. Air Force.** The single greatest influence shaping American military policy during the second half of the 20th century was the “Cold War” and with it, the threat of an all-out nuclear exchange (i.e., mutual assured destruction) between the United States and the Soviet Union. The massed forces of the Soviet Bloc, which attained nuclear weapons capability in 1949, compelled the United States and its allies to maintain a strong military presence, in effect, a war footing, in both hemispheres of the world, and most of the burden of providing airlift to these forces—strategic and tactical—fell upon the newly created USAF. Although the Cold War served to create a nuclear stalemate between the major powers (which included Communist China after late 1949), it did not prevent limited military conflicts between conventional forces in contested spheres of influence like Korea (1950–1953) and Southeast Asia (1961–1973).

**STRATEGIC AIRLIFT.** The Military Air Transport Service (MATS) was activated on June 1, 1948 as a Department of Defense Unified Command. While technically an inter-service agency merging the existing elements of both ATC and NATS, it was placed under overall USAF control. MAT’s general structure followed ATC, with operations segmented by region: (1) Atlantic Division, covering routes to Europe, the Caribbean, South America, North Africa and the Middle East; (2) Pacific Division, covering routes to Hawaii, Pacific Islands, East Asia, Southeast Asia, and Central Asia; and (3) Continental Division, covering routes to Canada, Alaska, the Aleutians, and Greenland. Operations in some divisions were further subdivided by mission: (1) Special Air Mission (SAS) included the Presidential Flight, Cabinet, Members of Congress, and desig-

nated foreign dignitaries; (2) Air Rescue Service (ARS) carried out rescue of downed military personnel and humanitarian relief to civilians; (3) Air Weather Service (AWS) provided weather forecasting and operated aircraft designated for weather-related missions; (4) Air Photographic and Charting Service (APCS) updated aeronautical charts and produced training films, public relations films, and newsreels; (5) Aeromedical Transport Wing (AMTW) evacuated wounded from combat zones and provided transport of critically ill military personnel and dependents to medical facilities; and (6) Air Resupply and Communications Service (ARCS) performed special operations missions from 1948 to 1956.

Within just weeks of MATS being established, the U.S. and its NATO Allies were confronted with a complete blockade of the Soviet corridor between the border of East Germany and the Allied sector of West Berlin, leaving airlift as the only means of supplying a civilian population of 4.5 million people. Because MATS was still a vestigial organization, it only played a supplementary role in the operation known as the Berlin Airlift. The USAF initiated airlift operations on June 26, 1948 by mobilizing TAC's C-47 and C-54-equipped troop carrier units but within a week, had all of MATS's C-54s in service (about 300, including five Navy R5D squadrons). Other MATS aircraft participating in the operation included one Douglas C-74, one Boeing C-97, and a small number of Lockheed C-121s. Despite the success of the operation in moving over 2.3 million tons of supplies over an 11 month period, the limitations of adapted airliners like the C-54 clearly pointed to an urgent need to equip MATS with purpose-built, heavy-lift transports which incorporated lengthwise loading ramps.

Following the Berlin Airlift, MATS strategic airlift capabilities underwent a rapid expansion both in terms of new aircraft placed in service and organization. Arrival of heavy-lift transports like the Boeing C-97 and Douglas C-124 enabled MATS to routinely airlift bulky pieces of equipment, vehicles, or large aircraft components to any location overseas; other modern aircraft, like the Douglas C-118 and Lockheed C-121, also entered service to augment or replace C-54s on long-range logistics support missions. During the Korean War (1950–1953), MATS formed the primary strategic airlift link between the continental U.S. and Japan, while troop carrier units of the 315th Air Division accomplished logistical airlift into Korea itself. Other aircraft operated by MATS during this era included Douglas C-47s on shorter logistical routes, Convair C-131s specialized for the aeromedical role, and Douglas C-74s providing heavy airlift to SAC and TAC units until 1952. MATS Air Rescue Service also operated Grumman SA/HU-16 amphibians, converted Boeing SB-17s and SB-29s, and several different types of helicopters; and Air Weather Service flew Boeing WB-47s and WB-50s.

The USAF transferred all long-range troop carrier operations from TAC to MATS in mid-1957, and with it, three Troop Carrier Groups equipped with Douglas C-124s. Growing to a strength of 14 operational Air Transport Wings by the middle 1950s, MATS functioned as the primary strategic airlift provider in every major international military operation supported by the U.S., notably: carrying UN troops and cargo to Europe in the Suez Crisis (1956); moving a Composite Air Strike Force across the Pacific to Taiwan in the Formosa Straits Crisis (1958); providing long-range logistical support to Antarctica in Operation Deep Freeze (1957–1963); moving UN troops and cargos over a 5,000-mile route in the Congo Airlift (1960–1963); deploying troops, equipment, weapons, supplies, and moving activated ANG tactical units in the Berlin Crisis (1961); and supporting the huge build-up of military strike and invasion forces in the southeast U.S. in the Cuban Missile Crisis (1962).

MATS continued to upgrade its transport fleet, replacing C-97s in the heavy-lift role with 50 turboprop-powered Douglas C-133s delivered from 1957 to 1959, and its first pure-jet long-range logistical transport, the Boeing C-135, started entering service in late 1961. Lockheed C-130s began the process of replacing older, piston-engine aircraft on shorter routes in 1962.



As the U.S. increased its military involvement in Southeast Asia during the early 1960s, MATS developed into the primary strategic airlift link, with terminals established at Da Nang, Cam Ranh Bay, and Tan Son Nhut in South Vietnam and at Bangkok, Thailand. MATS devoted a majority of its Douglas C-124 and C-133 fleet for heavy airlift into the SEA combat theater, and then introduced Lockheed C-141s as they became operational in 1965. On December 31, 1965, MATS was formally deactivated and replaced with Military Airlift Command (MAC).

**TACTICAL AIRLIFT.** Even though the AAF tactical airlift/troop carrier function was severely downsized after World War II, the escalation of the Cold War produced a series of buildups that led to a larger permanent force being maintained by the postwar USAF, with periodic activation of reserve and ANG units, as the need arose, becoming an important component of overall tactical airlift strength. Besides the transfer to TAC control, other noticeable features of postwar tactical airlift organization were changes in mission and aircraft. Due to availability of surplus aircraft, several active Troop Carrier Groups (TCG) reequipped with ex-ATC C-54s to take on a new “heavy” (i.e., long-range) mission, whereas reserve units retained their C-47s and C-46s. Active TCGs based in the continental U.S., reclassified as “medium,” had already begun the transition to Fairchild C-82s, the first operational AAF/USAF aircraft designed specifically for the tactical airlift role; however, under actual operational conditions, the C-82 proved to be seriously underpowered, which, after an extensive redesign effort by Fairchild, resulted in introduction, starting in late 1949, of the much-improved C-119. Another postwar innovation was the development of “light” tactical transports to take the place of assault gliders in combat operations. Tests begun with the Chase C-122 in 1948 ultimately led to mass production of the larger Chase/Fairchild C-123.

In June 1948, while TAC was mobilizing all of its C-54 units, C-47-equipped TCGs formed the first elements of the Berlin Airlift. Over the course of the operation (June 1948–May 1949), as part of the 1st Airlift Task Force, the five participating TCGs expanded into four Troop Carrier Wings (TCW) operating a mix of C-47s and C-54s, plus five C-82s used to move vehicles and bulky equipment to the two West Berlin airports. When the Korean War began in mid-1950, three reserve TCWs equipped with C-47s, C-46s, and C-54s were initially activated for duty in the Korean combat theater as the Far East Air Forces Combat Cargo Command. Then in early 1951, all TAC troop carrier operations were reorganized as the 18th Air Force, with the TCWs in Korea becoming part of the 315th Air Division. As new squadrons joined the 315th in the combat theater (consisting of four TCWs by the time hostilities ceased in mid-1953), they brought new aircraft types with them, C-119s replacing C-47s and C-46s, and C-124s replacing some C-54s. A typical TCW during this time comprised two or three TCGs operating two to four transport squadrons apiece.

TAC’s airlift organization continued to change throughout the 1950s. The C-119, with over a thousand in service by 1955, became the USAF’s principal type of tactical transport in medium units, active and reserve, and started entering service with ANG units in 1958. Light TCGs, typically based near Army posts, began taking deliveries of the first of 300 Fairchild C-123s in 1955. Tactical airlift finally entered the Jet Age when the first turboprop-powered Lockheed C-130s commenced operational service in late 1956. With the capabilities of the C-130 (twice the payload of a C-119, cruising 100-mph faster), TAC instituted a new mission known as the Composite Air Strike Force (CASF), designed for rapid overseas deployment of TAC fighter-bomber units and/or Army Airborne or light infantry units, with the first CASF deployment to Turkey taking place in 1958. Another realignment of the tactical airlift function came in 1957 when TCWs operating C-124s were transferred to MATS, with the proviso that they would be dedicated to support TAC during troop deployments, then in 1958, the 18th Air Force was deactivated, and the tactical airlift function transferred to control of the 12th Air Force.

The early 1960s saw completion of the transition from C-119s to C-130s as TAC's principal type of medium tactical transport, plus opening airlift involvement in Southeast Asia began in 1962 with deployment of two C-123 squadrons to South Vietnam. As the USAF buildup in Southeast Asia continued during 1963 and 1964, control of airlift operations was split between two commands: the 315th Air Division covering inter-theater airlift from Japan and the Philippines to South Vietnam and Thailand; and the 834th Air Division covering intra-theater operations within South Vietnam and Thailand. By the end of 1965, the 315th was operating twelve C-130 squadrons and one C-118 squadron for medical evacuation; and the 834th comprised four C-123 squadrons (attached to the 315th Air Commando Group). As the Vietnam War intensified, the 834th's intra-theater role expanded to include the newly activated 483rd TCW, operating ex-Army C-7s, plus control of C-130s rotated for duty within South Vietnam itself. During the same timeframe, because most of the inter-theater role was assumed by MAC C-141s flying directly into South Vietnam and Thailand, the 315th was deactivated in April 1969. In 1974, following the withdrawal of U.S. Forces from Southeast Asia, all of the USAF's tactical airlift function was transferred from TAC to MAC.

**U.S. Army.** Under the military restructuring of 1947 and 1948, the USAF was given the task of providing all strategic and tactical airlift to the Army. The Army's fledgling Aviation Branch was left with approximately 650 two-seat liaison aircraft (e.g., L-4s, L-5s, and L-16s) and was in the process of acquiring its first generation of helicopters, mostly two-seat H-13s. Since that time, adequacy of USAF tactical airlift has been a continuing source of disagreement between the two services. Despite the advent of larger cargo and troop-carrying helicopters (e.g., CH-34, CH-37, and CH-47), the Army has pushed for authority to acquire fixed-wing intra-theater transports on the premise of lower operating costs in relation to payload and range compared to that of helicopters.

Between 1959 and 1962, as a corollary to the Army's "Airmobile" concept (i.e., using helicopters to move troops and supplies in a combat zone), the Aviation Branch received approval (over USAF protests) to procure 164 De Havilland CV-2 (C-7) Caribous, twin-engine STOL transports that could carry 32 troops or 8,000 lbs. of cargo. Initial deployment to South Vietnam, starting in 1962, demonstrated Caribous could support many outlying bases that were inaccessible to USAF tactical transports. In 1963, with Caribou operations well underway, the Aviation Branch began moving forward with even more ambitious plans to expand its fixed-wing fleet with the turboprop-powered De Havilland CV-7 (C-8) Buffalo. However, further Army efforts along this line came to an abrupt halt in 1966 when the Army Chief of Staff agreed to cancel plans to procure the De Havilland Buffalo and transfer all but 20 of its Caribous to USAF control (i.e., Johnson-McConnell Agreement of April 1966).

In terms of unit structure, Army aircraft were originally attached directly to combat divisions or subordinate units without any central scheme of organization, but after growing in size and complexity during the mid-1950s, were formed into company-sized units, and with the Airmobile expansion in the early 1960s, further organized into battalions. Small utility transports like De Havilland L-20 (U-6) Beavers and U-1 Otters typically served with Light Fixed-Wing Aviation Companies attached to various combat commands, whereas the larger Caribous were organized into Aviation Companies (Airmobile-Fixed-Wing) under the control of the Transportation Corps.

**Navy, Marine Corps, and Coast Guard.** In the years immediately following World War II, active Navy forces — ships, aircraft, and manpower — were downsized by a factor of almost 90 percent, with most of its ships and aircraft either being scrapped or placed in mothballs. Likewise, the Marine Corps shrank from six combat divisions and five air wings down to two under-strength divisions and two skeletal air wings. The Coast Guard was similarly reduced in size

and control of it returned to the Treasury Department. But like the USAF and Army, the rise of the Cold War became a huge stimulus for the buildup of a much larger permanent force. The ability to move nuclear-armed Navy carrier task groups and/or deploy Marine amphibious forces near enemy shores developed into a key ingredient of U.S. strategic deterrence during this period.

**STRATEGIC AIRLIFT.** Although NATS ceased to be an independent command when it was merged into MATS in June 1948, the Navy nevertheless retained control of five squadrons (plus a sixth added in 1951) as an organic strategic airlift component known as Fleet Logistics Support (FLS). During the Korean War (1950–1953) four Navy and two Marine FLS squadrons, equipped with R5Ds, provided the bulk of strategic airlift to Navy and Marine combat forces in the Pacific. Navy units within both MATS and FLS received new equipment during the early 1950s, exchanging their R5Ds for Douglas R6Ds (C-118) and Lockheed R7Vs (C-121). In 1952 and 1953, FLS squadrons also began taking deliveries of newly converted R4D-8s (C-117D) that carried personnel and freight on shorter routes. The NAS Alameda-based seaplane unit, VR-2, retained its Martin Mars flying boats until 1956, when they were replaced with turboprop-powered Convair R3Ys; however, the squadron was deactivated soon after the R3Ys were grounded in mid-1958. Even though the Navy announced plans to withdraw from MATS, which was due to be inactivated in December 1965, several Navy squadrons did remain under MAC control until mid-1967.

**TACTICAL AIRLIFT.** After World War II, the Navy routinely assigned transport aircraft (e.g., R4Ds, R5Ds, and JRB/SNBs) to active and reserve shore-based units for staff transportation and logistics but had no clear-cut tactical airlift mission until the Korean War, when it established a ship-to-shore logistical operation known as carrier onboard delivery (COD), initially with General Motors TBMs converted to the task. The first purpose-built COD transports, twin-engine Grumman TF (C-1) Traders, began entering operational service in 1957. At first, COD aircraft were assigned to the fleet as detachments of regular FLS (VR) squadrons, then starting in the early 1960s, were reorganized into three dedicated COD squadrons (VRC-30, VRC-40, and VRC-50).

In the immediate postwar period, Marine aviation was reduced to one tactical airlift squadron (VMR-252) equipped with Curtiss R5Cs (C-46). In mid-1950, after converting to Fairchild R4Qs (C-119), the unit deployed to Korea for combat. A second squadron (VMR-253), activated in mid-1951 with R5Cs, reequipped with R4Qs before the end of the year and deployed to Korea in 1952, and both units remained in active service over the next decade. In 1962, when the Marines began taking delivery of the Lockheed KC-130F (a tanker-cargo variant based on the C-130B), all active airlift functions, strategic and tactical, were reorganized as “assault support” and squadrons reclassified as follows: VMR-252, based at MCAS Cherry Point, North Carolina, became VMGR-252; VMR-253, based at MCAS Iwakuni, Japan, was re-designated VMGR-152; and VMR-352, formerly a FLS C-54 unit based at MCAS El Toro, California, became VMGR-352. During the same time, VMR-234, equipped with the C-119F, was established as a reserve unit at NAS Minneapolis, Minnesota.

The Coast Guard continued to operate several R4Ds for logistics support between bases until the early 1960s; the two remaining R5Cs were retired in 1950. At least three ex-USAF and -Navy R5Ds (C-54) were utilized by the Coast Guard on a mission known as international ice patrol from 1958 until 1965, when the final example was withdrawn. The first of six R8Vs (C-130B) began entering Coast Guard service in 1959, where they were used for logistics, ice patrol, and search and rescue. Though dedicated primarily to search and rescue, the Coast Guard also maintained a fleet of 88 Grumman UF (HU-16) utility amphibians from 1951 through the remainder of this era.

## Modern Era—1966 to Present

**Recent Influences on Military Policy.** The last 46 years has been a time of significant change for all of the American armed forces. The harsh lessons of Vietnam led the Army and USAF to adopt the Air/Land Battle concept in 1981, mandating a fully integrated battle plan between air (USAF) and land (Army) forces in any military scenario, including theater airlift support. But the most far-reaching change came with passage of the Department of Defense Reorganization Act of 1986 (also known as the Goldwater-Nichols Act). The Act effectively shifted operational control of military forces from their respective service chiefs to a centralized command under the Chairman of the Joint Chiefs of Staff (CJCS) who, in turn, reports directly to the President and the Secretary of Defense and has authority to designate a unified command for missions and forces in any given campaign or operation, including overall logistics. Moreover, since 2010, the Air/Land Battle concept has been extended to include Air/Sea Battle, so that today, in any military operation, all forces—Army, USAF, Navy, and Marine Corps—are employed according to a common plan, under one command. In the post–Cold War era (1991–present), and especially since the terrorist attacks of September 11, 2001, military emphasis has been placed upon the ability to deploy conventional forces in response to any threat to the National Security of the United States. Reliance on force mobility—the means to rapidly project military power anywhere in the world—places airlift, strategic and tactical, at the forefront of overall strategy.

**U.S. Air Force.** Significantly, total USAF strength, including active duty, reserve, ANG, and civilian, has diminished by a factor of almost 50 percent, from a peak of over 1,200,000 personnel in 1968 to 694,000 at the end of 2011, and at the same time, reserve and ANG units have grown to become a larger proportion of the total (i.e., from about 15 percent to 26 percent). The ending of the Cold War not only brought about reductions in force but also decreased the need to maintain many overseas bases and terminals, so that principal forces are now concentrated in the continental U.S. Of equal importance has been a fundamental change in strategic emphasis from nuclear weapons directed at a centralized threat (i.e., the Soviet Union) to rapid deployment of conventional forces against widely dispersed threats (i.e., the War on Terrorism).

**STRATEGIC AIRLIFT.** On January 8, 1966, Military Airlift Command (MAC) became the successor organization to MATS. Whereas MATS had been a unified Department of Defense agency, MAC was entirely a USAF command. Former Navy units withdrew, although some of their aircrews continued to fly with MAC units until 1967. At first, MAC mainly carried out the strategic missions of MATS and maintained a similar global route structure, dividing operations between five major divisions located at Andrews AFB, Maryland; Hurlbert Field, Florida; Stewart AFB, Tennessee; Hickam AFB, Hawaii; and Ramstein AB, Germany. MAC also retained the Air Weather Service, Air Rescue Service (later renamed Aerospace Rescue and Recovery Service), Special Airlift Mission (e.g., Presidential Flight), Air Photographic and Charting Service, and Aeromedical Transport Wing, while control of Air Commando operations (later renamed Special Operations) had been moved to TAC in 1961. At the time MAC came into existence, great airlift emphasis was being placed on the Vietnam War, with ongoing support facilities in the Philippines, Guam, Midway Island, Japan, and South Korea, as well as the terminals in South Vietnam and Thailand. From the mid- to late 1960s, MAC's active squadrons completed the transition from piston-engine transports (e.g., C-54, C-118, C-121, C-124, and C-131) to turboprop and jet aircraft (e.g., C-130, C-133 [retired in 1971], C-135, C-141, C-5, and C-9). MAC's heavy lift capabilities increased exponentially when C-5s began entering service in 1970, though the aircraft did not perform up to its design specifications until after the wing replacement program completed between 1978 and 1987. The payload capacity of the MAC fleet received

yet another boost when, from 1977 to 1983, 270 of its C-141s underwent a 23.3-foot fuselage stretch.

During the Vietnam War, conflicts between strategic and inter-theater tactical airlift functions became a frequent source of confusion. This was due in part to a blending of roles in newer types of transports, for example: a C-130, at some reduction in range, could carry a substantially higher payload at a faster cruise speed than the C-118s and C-121s they replaced; likewise, the C-141, a long-range heavy lifter, could also fly into a combat zone to drop paratroops and supplies. Initially, in 1968, the USAF sought to rectify the matter by transferring all MAC C-130s to TAC control; however, duplication of aerial port facilities and mission objectives continued to be a problem. Then in 1974, following a detailed USAF study, all of TAC's tactical airlift function was transferred to MAC control, followed in 1975 by tactical airlift units remaining in PACAF and USAFE. By this time, all piston-engine tactical transports (e.g., C-119s, C-123s and C-7s) had been withdrawn from active service (also retired from reserve and ANG units by 1981). From 1983 to 1990, the task of supporting Special Operations was also transferred to MAC, along with a mix of MC-130s, AC-130s, and helicopters then attached to the 1st Special Operations Wing; however, this mission was elevated to independent command status and re-designated Air Force Special Operations Command in mid-1990.

On June 1, 1992, as part of a major realignment of all USAF commands, MAC was deactivated and succeeded by Air Mobility Command (AMC). In addition to MAC's strategic and tactical airlift functions, AMC also assumed the air-refueling mission that had formerly belonged to SAC. Thus, with most of the USAF's KC-135 fleet (including reserve and ANG), AMC likewise gained control of 59 McDonnell Douglas KC-10s that could serve as strategic airlifters as well as long-range refueling platforms. The post-Cold War and Gulf War force reductions continued within AMC, dropping from MAC's 1991 level of 21 active Airlift Wings (strategic and tactical) to four Air Mobility Wings, six Airlift Wings, two Airlift Groups, and four Air Refueling Wings (KC-135) as of the end of 2011. In 1995, AMC also initiated the process of bringing C-17s to fully operational status in conjunction with the gradual phase-out of the C-141 fleet, with all of the latter having been withdrawn from active service by mid-2003 and from ANG and AFRES units by mid-2006.

In 2003, a majority of AMC's Wings and subordinate units were split into two Expeditionary Air Mobility Task Forces (EMTF), the 15th EMTF headquartered at Travis AFB, California, and the 21st EMTF at Scott AFB, Illinois. Today, a typical Air Mobility Wing (as opposed to an Airlift Wing), in addition to airlift squadrons equipped with C-17s and/or C-5s, includes one or more KC-10 squadrons, plus support units for operations, maintenance, aerial port facilities, and aeromedical functions. In addition to active forces, AMC has operational control of ANG units comprising twenty-three Airlift Wings and eighteen Air Refueling Wings (KC-135) and AFRES (reserve) units comprising two Air Mobility Wings, sixteen Airlift Wings, five Air Refueling Wings (KC-135), and two Air Refueling Groups (KC-135), which account for approximately 46 percent of total forces available.

**TACTICAL AIRLIFT.** Since 1974, control of the USAF's strategic and tactical airlift functions have been merged under a single command (MAC 1974-1992; AMC 1992-present), thereby avoiding much of the earlier managerial confusion associated with theater airlift. During this time, active Airlift Wings and Groups have been equipped with one type of aircraft, the C-130E and the C-130H, and more recently, the C-130J (89 by the end of 2011), and ANG and AFRES units have been similarly equipped since 1980. Efforts in the mid-1970s to replace C-130s with the pure-jet AMST prototypes, the Boeing YC-14 and McDonnell Douglas YC-15, were abandoned in favor of C-17 development. The C-17, with the capability to land on semi-prepared airstrips as short as 3,000 feet, is fully functional as an inter-theater tactical transport in addition to its strategic role.



For all practical purposes, the USAF has fielded no type of intra-theater tactical transport (e.g., C-123s and C-7s) in active units since 1973 or in ANG and AFRES units since 1980. The eighteen Short C-23s operated under MAC control from 1984 to 1990 never served as tactical transports but were used for short-haul logistical support between USAF bases in Europe. Similarly, the ten Aeritalia C-27As procured during the early 1990s never served under AMC control but were operated as part of USSOUTHCOM, a joint services task force which supported counter-narcotics and humanitarian missions in South America. While the issue of control over the Alenia C-27J was resolved in favor of the USAF in 2009, the four examples delivered as of 2011 (up to a planned procurement of 38), have thus far been allocated to the 702nd Expeditionary Squadron, based in Afghanistan, which is subordinate to Air Combat Command (ACC) rather than AMC. Recent reports (early 2012) suggest that future C-27 acquisitions could be a victim of projected cuts in defense spending.

**U.S. Army.** Other than light personnel and cargo transports like the Gulfstream C-20/-37 and Cessna UC-35, the Army maintains no type of strategic airlift, and in the interval since the Johnson-McConnell Agreement of 1966, has relied primarily upon helicopters (e.g., the CH-47 and to a lesser extent, the UH-1 and UH-60) to provide organic tactical airlift. Despite the supposed fixed-wing ban, however, the Army has been resourceful over the years in finding other means to plug the gap. In 1967, while giving over most of its CV-2 (C-7) fleet to USAF control, the Army was simultaneously taking delivery of the first of 140 Beech U-21As, which subsequently saw wide service in Vietnam in tactical support roles such as troop movement and medical evacuation. And since 1975, the Army has likewise taken delivery of 144 Beech C-12s that have been utilized for a variety of utility transport duties. During the late 1980s and early 1990s, through a series of contracts, the Army acquired 46 Short C-23s (42 still active as of 2011) which have since been employed overseas as intra-theater tactical transports. In an apparent loophole, the C-23s do not technically belong to active forces but are operated and maintained by the Army National Guard as part of the Operational Airlift Support Agency (OSAA). Currently, OSAA's airlift fleet also comprises 57 C-12s and 11 Fairchild C-26s that are used to carry personnel and cargos. As mentioned above, Army plans to replace its C-23s with the C-27J are on hold for the foreseeable future.

**Navy, Marine Corps, and Coast Guard.** Like the other services, the Navy has been subjected to significant force reductions, falling from 880 active ships and 8,026 active aircraft in 1965 down to 285 active ships (minus 68 percent) and about 3,700 active aircraft (minus 54 percent) in 2011. In terms of strategy, the Navy's military focus has shifted from large-scale, potentially nuclear strikes against the Soviet Bloc to regional conflicts with conventional weapons. But its primary order of battle — the ability to position a carrier and/or amphibious assault force within striking distance of a trouble spot — remains essentially unchanged. Although total Marine manpower and active aircraft levels have declined by a factor of one-third since the Vietnam War, the three Division, three Air Wing structure of the Fleet Marine Force (FMF) has been maintained. The Coast Guard, over this period, has actually grown by over 30 percent in terms of manpower and aircraft. During the Vietnam War, in 1967, control of the Coast Guard was transferred to the Department of Transportation, then in 2003, to the Department of Homeland Security.

**STRATEGIC AIRLIFT.** When the Navy withdrew from MATS in January 1966, it acquired five ex-MATS squadrons equipped with a mix of C-130s, C-121s, and C-118s, however, all were disestablished within three years. This left the Navy with a core of five strategic transport squadrons (VR), two with C-118s and C-131s and three with C-130s. Following the Vietnam War, Navy strategic airlift operations were downsized to three squadrons, VR-1 (C-118 and C-131) at NAS Norfolk, Virginia; VR-21 (C-118) at NAS Barbers Point, Hawaii; and VR-24

(C-130), which operated in detachments from Spain and Italy. Active VRs began phasing-out their C-118s and C-131s in the early 1970s as Douglas C-9s and North American CT-39s arrived to replace them, although some piston-engine transports remained with reserve units until 1981. With the exception of COD, the Navy began transferring and decentralizing much of its airlift function, strategic and tactical, to ten different reserve squadrons during the late 1970s, with the last active unit, VR-24, finally being disestablished in 1993. As of 2011, Navy airlift is split between fifteen reserve squadrons, all based in the continental U.S., and aircraft types operated by them include one (VIP) squadron with C-20s and C-37s, two with C-20s, four with C-9s, three with C-40s, and five with C-130s. All C-9s are due to be replaced by C-40s in the near future. The Marines currently operate two C-9s in VMR-1 out of MCAS Cherry Point, North Carolina.

**TACTICAL AIRLIFT.** Formerly operating as detachments of regular VR squadrons, the Navy's tactical airlift function was reorganized in 1966 into three tactical support squadrons, VRC-30 based at NAS North Island in San Diego; California, VRC-40 at NAS Norfolk, Virginia; and VRC-50 at NAS Atsugi, Japan. All three units were equipped with a mix of aircraft, C-1s and C-2s (from late 1966) for carrier operations (COD), along with C-130s, C-131s, and CT-39s for land-based operations. COD aircraft were typically distributed in detachments among carriers on a deployment, and during the Vietnam War, detachments of VRC-50 operated out of Da Nang to directly support combat operations off Dixie and Yankee Stations. From the mid-1960s to the mid-1970s, the Navy also used HU-16 utility amphibians based at various coastal naval stations, including U.S. Trust Territories in the Pacific, to provide search and rescue assistance and logistical support. In the two decades following Vietnam, the three tactical support squadrons were retained to support the Navy's Cold War carrier force. Equipment upgrades in the late 1970s included seven US-3s (a COD derivative of the Lockheed S-3 ASW platform) that entered service with VRC-50, then from 1986 to 1988, in an across-the-board re-procurement program, all C-1A and C-2As were withdrawn and replaced by 39 new-build C-2A(R)s. In 1994, after the post-Cold War force reductions, VRC-50 was disestablished and all of the US-3s withdrawn within a few years. Today, VRC-30 and VRC-40 operate 36 C-2A(R)s which have completed a service life extension program (SLEP) which is likely to keep them active until 2027.

During the Vietnam War, the Marines maintained three active tanker-transport squadrons equipped with KC-130s — VMGR-152 (1st MAW) relocated to Kadena AB in Okinawa, VMGR-252 (2nd MAW) at MCAS Cherry Point, North Carolina, and VMGR-352 (3rd MAW) at MCAS El Toro, California — plus one reserve unit, VMR-234 operating C-119s from NAS Minneapolis, Minnesota. VMR-234 moved to NAS Glenview, Illinois, in 1970, reequipped with KC-130s in 1975, and changed its designation to VMGR-234 in 1983, then relocated again in 1995 to JRB Ft. Worth, Texas. A KC-130 training squadron, VMGRT-253, was added in 1986 and served as part of the 2nd MAW until being deactivated in 2006. In response to the War on Terrorism, the Marines created a second KC-130 reserve squadron in 2002, VMGR-452, which operates from Stewart ANGB in New York. At the time of this writing, all three of the active VMGRs have been upgraded to the KC-130J.

Since the 1930s the Coast Guard has maintained a VIP transport service for its command staff and the executives of its controlling department (e.g., Treasury, Transportation, and now, Homeland Security). Normally based at Washington National Airport, the following light transports have served during this period: VC-3 (RM) 1953 to 1969; VC-4, 1963 to present; VC-11, 1969 to 1985; C-20 1985 to 2002; and C-37, 2002 to present. Traditionally, the Coast Guard has also used its fixed-wing maritime surveillance aircraft for logistical support, as the need arose, or to drop supplies to ships in distress or downed aircrew. Aircraft types, typically receiving an "H" prefix to denote their maritime role, have included the following: HU-16 (UF), 1951 to

1983; HC-130 (R8V), 1959 to present; HC-131, 1976 to 1983; C-143 (command and control), 2005 to present; and HC-144, 2006 to present. Available references do not indicate whether the 41 Dassault HU-25s acquired by the Coast Guard since 1982 have ever been used as transports; however, the HC-144s replacing them are readily convertible to logistical functions.

**Special Operations.** The term “special operations” refers to the use of “irregular” military forces — Army Special Forces, Marine Corps Force Reconnaissance, Navy SEALs, USAF Special Operations Units, Coast Guard Deployable Operations Group, or CIA Special Units — to achieve a military objective where the use of a conventional force is not practical. Even though special operations date back to the Army Office of Strategic Services (OSS), Navy Underwater Demolition Teams (UDT), and Marine Raiders of World War II, its use as a tactic has steadily grown in significance over the past 50+ years, the last 25 years in particular. Special operations units may act either independently or in conjunction with conventional forces to perform missions in categories such as clandestine reconnaissance, counter-insurgency (i.e., tactics against guerilla-type forces), counter-terrorism, low-intensity attack, hostage rescue, foreign internal defense, and information dissemination (i.e., propaganda). In addition to tactical air support, special operations units commonly depend upon some form of airlift, fixed and rotary-wing, for insertion, re-supply, and extraction. Throughout the Vietnam War, USAF Air Commando/Special Operations units routinely airlifted Army Special Forces, ARVN, and Montagnard teams in and out of South Vietnam, Laos, and Cambodia with C-123s, C-7s, and U-10s, and the Army used its own U-1s, U-6s, U-10s, and helicopters for the same purpose. The Vietnam era also marked the introduction of USAF transports optimized for special operations like the MC-130 Combat Talon, AC-47 Spooky, AC-119 Shadow, and AC-130 Spectre gunships.

The ill-fated hostage rescue attempt from the American embassy in Iran in 1980 revealed a serious lack of command and control and poor inter-service cooperation as major factors in the failure of the mission. Subsequent efforts to rectify the problem led directly to creation of United States Special Operations Command (USSOCOM or SOCOM) in April 1987, placing all future special operations under one unified command. SOCOM’s first inter-service undertaking — Operation Earnest Will, commenced in September 1987 against Iranian attacks on



Lineup of 6th Special Operations Squadron at Hurlburt Field, Florida in 2007 or 2008 showing a Douglas C-47T, a Mil Mi-8 helicopter, an Antonov An-26, and two Bell UH-1 helicopters in the foreground.



U.S.-flagged tankers in the Persian Gulf— clearly demonstrated the efficacy of the unified command structure. More recently, in May 2012, a SOCOM operation involving USAF C-17s and MC-130s, Army MH-60s, and Navy SEALs, carried out a pinpoint attack in Pakistan that resulted in the deaths of Osama bin Laden and other key Al Qaeda terrorists. Aviation support of SOCOM has been progressively upgraded over the intervening 25 years so that today, the 1st Special Operation Group, a component of Air Force Special Operations Command (AFSOC) within SOCOM, boasts eight squadrons operating a variety of specialized aircraft such as the AC-130U, C-130H, MC-130H/P, An-26 (ex-Soviet), C-47T, CV-22, and U-28A.

**Civil Reserve Air Fleet.** Shortly after World War II began, the nation's airlines were in effect nationalized for the duration of the war. Afterward, in order to establish a cooperative program in which civil airlines could be mobilized to augment military airlift in times of need, the U.S. Government instituted a program in 1952 known as the Civil Reserve Air Fleet (CRAF). In exchange for subsidies and funded modifications to aircraft (e.g., cargo doors and reinforced floors), participating air carriers may voluntarily enter contracts with the USAF (MATS, MAC, and now AMC) to make aircraft available for military airlift when called upon. While airlines routinely carried military cargos and personnel during the 1950s, 1960s, 1970s, and 1980s pursuant to various contractual arrangements, CRAF was not actually mobilized for the first time until August 1990, in preparation for the Gulf War, during which time CRAF aircraft carried two-thirds of the personnel and one-fourth of the cargo into the military theater of operations. CRAF was mobilized again on February 2003 for Operation Iraqi Freedom, ultimately airlifting 254,143 troops and 11,050-tons of cargo over a fourth month period.

# SERIES I

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## 1925 to 1962

### A. USAAC, USAAF, USAF, AND U.S. ARMY AIRCRAFT

#### Douglas C-1—1925

##### Technical Specifications (C-1)

Type: Cargo transport and air ambulance.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 26 (USAAS/USAAC).

Capacity: Crew of two plus six passengers or 2,500 lbs. of cargo.

Powerplant: One 435-hp Liberty V-1650-1 12-cylinder water-cooled inline engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 116-mph, cruise 85-mph; ceiling 14,850 ft.; range 385 mi.

Weights: 3,836 lbs. empty, 6,443 lbs. loaded.

Dimensions: Span 56 ft. 7 in., length 35 ft. 4 in., wing area 805 sq. ft.

Ordered by the Army Air Service (became Army Air Corps in 1926) in early 1925, the Douglas C-1 holds the distinction of having been the first Army aircraft to be classified under a cargo transport designation. Douglas evolved much of the C-1's single-bay, biplane layout from the earlier designs of the Army DWC (Douglas World Cruiser) and Navy DT (Douglas Torpedo). Airframe structure consisted of a fabric-covered, welded steel tube fuselage and built-up wooden framed wings, and as with the DWC and DT, a wide-track landing gear was incorporated into the cabane struts. A trap door located in the bottom of the fuselage allowed loading of cargo, and a door for passengers was located on the left side over the lower wing; pilot and co-pilot sat side-by-side in an open cockpit directly behind the engine. The first C-1 flew on May 2, 1925, and all of the ten ordered had been delivered to the Army by the end of the year.

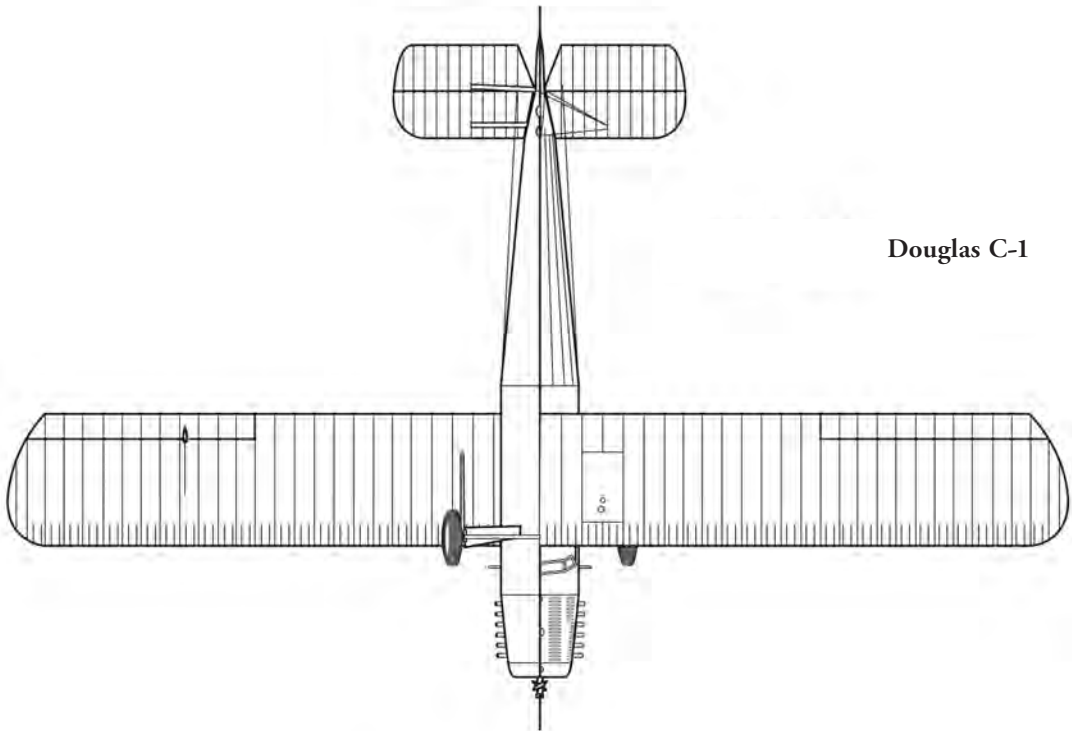
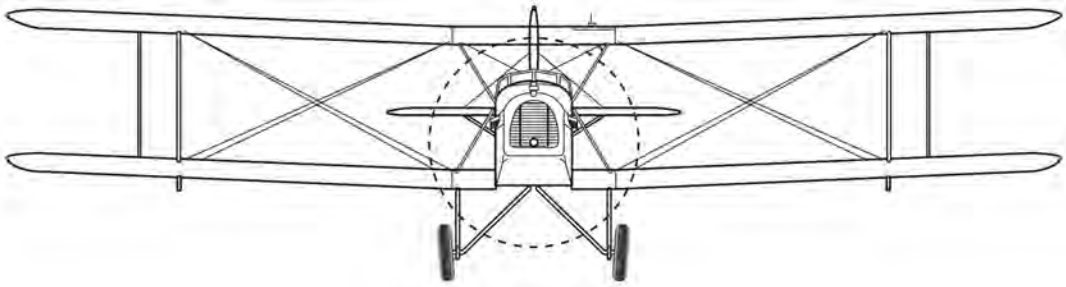
One C-1 became the C-1A in 1926 after undergoing conversion to a geared Liberty engine, and a C-1B was projected but never built. During the same timeframe, two C-1s outfitted to carry four medical litters and related equipment were tested at McCook Field in Dayton, Ohio as air ambulances. The first of 17 C-1Cs was introduced in late 1926 with a three-foot five-inch increase to wingspan, modified landing gear, a metal cabin floor, and a balanced rudder, which all combined to raise useful load by nearly 1,000 lbs. Standard equipment on C-1Cs included fittings for conversion to the air ambulance role. In addition to transportation duties, C-1s were



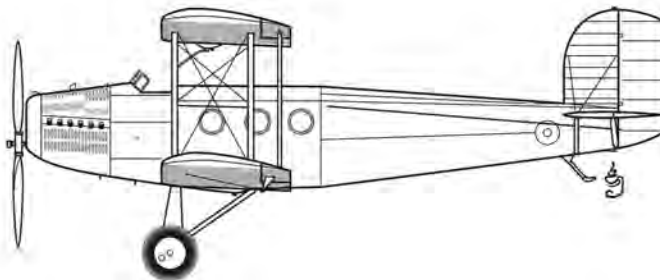
One of ten C-1s delivered in 1925 as the Army's first dedicated transport aircraft. Another 17 improved C-1Cs appeared in 1927.



This C-1 is participating in in-flight refueling experiments with the Fokker C-2A "Question Mark" in 1929.



**Douglas C-1**



used to conduct early air-to-air refueling experiments, and two participated as tankers in the 1929 record endurance flight of the modified Fokker C-2 *Question Mark*.

## Fokker C-2, C-5, and C-7 (TA/RA)—1926

### Technical Specifications (C-2A)

Type: Staff and cargo transport.

Manufacturer: Atlantic Aircraft Div. of Fokker Aircraft Corp. of America, Hasbrouck Heights, New Jersey.

Total military versions: 19 (12 USAAC; 7 USN/USMC).

Capacity: Crew of two plus eight passengers or 2,400 lbs. of cargo.

Powerplants: Three 220-hp Wright J-5 R-790 *Whirlwind* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 113-mph, cruise 100-mph; ceiling 12,500 ft.; range 350 mi.

Weights: 6,725 lbs. empty, 10,395 lbs. loaded.

Dimensions: Span 71 ft. 10 in., length 48 ft. 7 in., wing area 729 sq. ft.

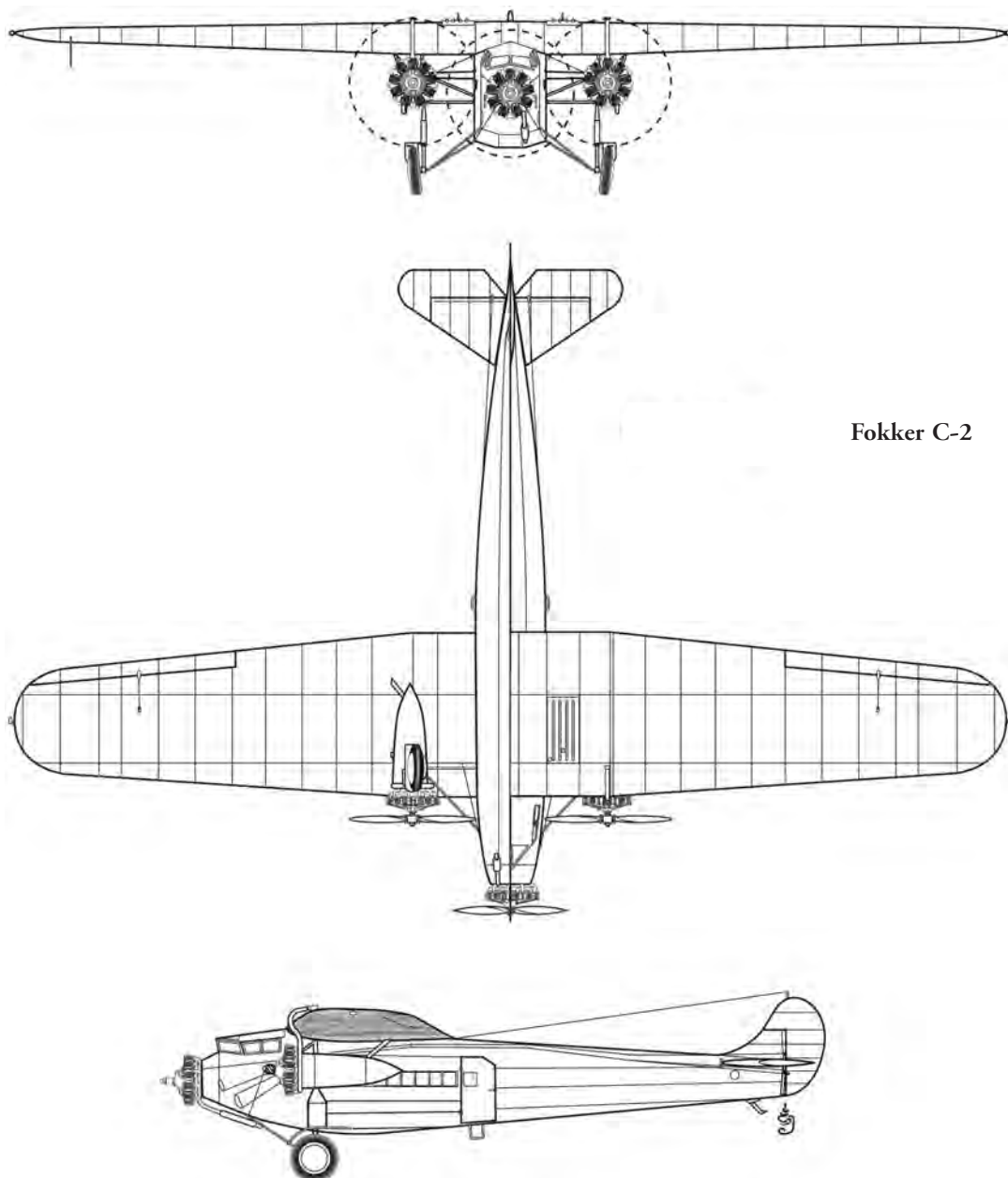
The Dutch-designed Fokker F.VIIa/3m made its debut in the American airliner market when it came to national attention during the 1925 Ford Air Reliability Tour. Designed by Walter Rethel in 1924, the F.VII series were high-wing monoplanes featuring a welded, steel tube fuselage and tailplane structure covered in fabric with built-up wooden wings skinned in a plywood veneer. So as to downplay Fokker's wartime association with Germany, the company created an American-registered subsidiary under the name Atlantic Aircraft Division to reassemble and deliver aircraft sold in the U.S. Three F.VIIa/3ms were ordered by the Army in 1926 to a revised specification calling for a slightly wider fuselage and a cockpit enclosure moved forward



One of eight Fokker C-2As delivered in 1928. It differed from the civil F.VIIa in having a wider fuselage, the cockpit positioned forward, and eight and a half feet greater wingspan.

of the wing. The first Army example, delivered under the military designation C-2, subsequently received long-range fuel tanks and a new wing having eight and a half feet greater span. Named *Bird of Paradise*, this aircraft completed the first nonstop flight between the U.S. west coast and the Hawaiian Islands (2,400 miles) on June 28, 1927.

A follow-on Army order resulted in the delivery of eight long-wing versions in 1928 as the C-2A. One of the C-2As, dubbed *Question Mark* and piloted by Maj. Carl Spaatz and Capt. Ira Eaker, set a world flight endurance record of 150 hours on January 7, 1929. When Fokker followed the F.VII in 1929 with the slightly larger F.Xa, powered by 300-hp Wright R-975



Fokker C-2





Based on the slightly larger F.Xa airframe, the sole C-5 was acquired in 1929.

engines, the Army acquired one example and placed it in service as the C-5. One of the C-2As became the XC-7 in 1929 when it was refitted with 300-hp Wright engines. As a result of the XC-7 test program, the Army ordered six R-975 powered aircraft as the C-7A, which utilized a combination of C-2A wings, F.Xa fuselages, and the enlarged fin and rudder of the Fokker XLB-2 bomber prototype. The Fokker tri-motors remained in Army service, functioning in various transportation, staff liaison, and air ambulance roles, until replaced by newer types of aircraft during the early and mid-1930s.

*Naval Variants:* Following the Army order in 1926, the Navy contracted for three F.VII/3ms built to an identical specification, and as they were delivered through 1927, placed them in service under the transport designation TA-1. All three TA-1s were subsequently assigned to VO-6M as part of the Second Marine Brigade in Nicaragua. A new naval order in 1928 resulted in VO-6M receiving two TA-2s in 1928 which differed from the -1 in having nine-feet six-inches added to wingspan. In 1930 the three TA-1s and two TA-2s were modified to accept installation of 300-hp Wright R-975 engines and all returned to service as the TA-3. When Navy adopted the “R” for transport designation in 1931, the TA-3s became RA-3s. In late 1930 and early 1931, as the RA-4, the Navy evaluated a Fokker F.Xa that came with an 18-inch nose extension and three 450-hp Pratt & Whitney *Wasp* engines encased in ring cowls, but ultimately judged the aircraft as unsuitable for service. The RA-3s do not appear on Marine records after 1932 and presumably had been withdrawn.

## Ford C-3 and C-9 (JR/RR)—1926

### Technical Specifications (C-3A)

Type: Staff and cargo transport.

Manufacturer: Stout Metal Airplane Div. of Ford Motor Co., Dearborn, Michigan.

Total military versions: 11 (8 USAAC; 3 USN/USMC).

Capacity: Crew of two plus 11 passengers or 1,725 lbs. of cargo.

Powerplants: Three 235-hp Wright R-790-3 *Whirlwind* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

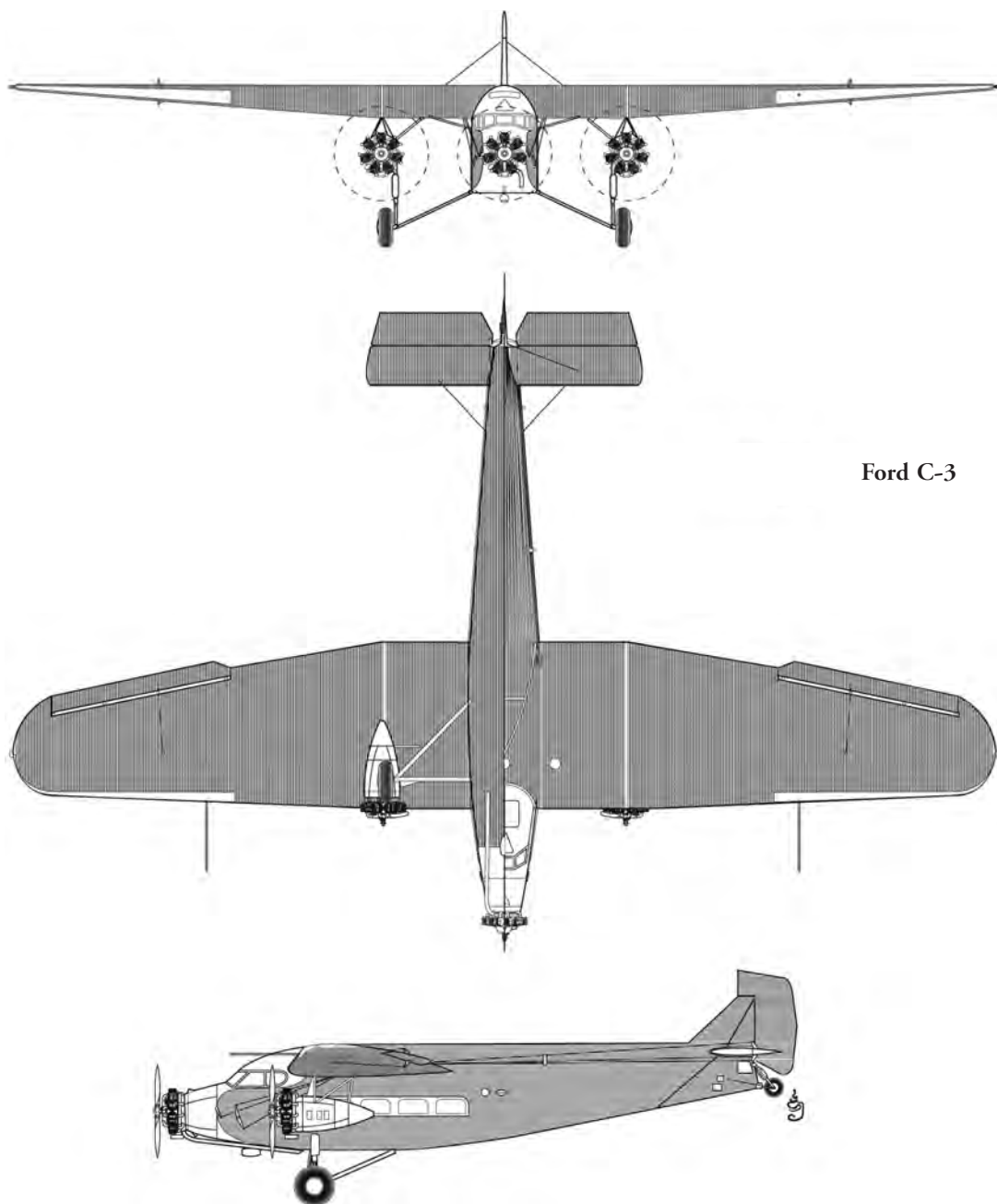
Performance: Max. speed 132-mph, cruise 107-mph; ceiling 16,500 ft.; range 570 mi.

Weights: 6,500 lbs. empty, 10,130 lbs. loaded.

Dimensions: Span 74 ft., length 49 ft. 10 in., wing area 785 sq. ft.

The origins of the famous Ford Trimotor date to 1925 when automaker Henry Ford and a group of investors acquired the Stout Metal Airplane Co. Using methods developed in Germany by Prof. Hugo Junkers, William B. Stout had pioneered the use of fully cantilevered, all-metal

airframe structures that were skinned in corrugated duraluminum. Ford's first aircraft, the 8-passenger 4-AT-A, powered by three 200-hp Wright J-4 engines, made its first flight in June 1926, appearing with a high-wing aerodynamic configuration closely resembling that of the Fokker F.VII/3m. The Army procured a single 4-AT-A for testing at Wright (formerly McCook) Field, Ohio in February 1928 under the assigned designation XC-3. Following successful evaluations, Ford received an order for seven more aircraft, 4-AT-Es with uprated 235-hp engines, which entered service during 1929 as the C-3A.



Ford C-3

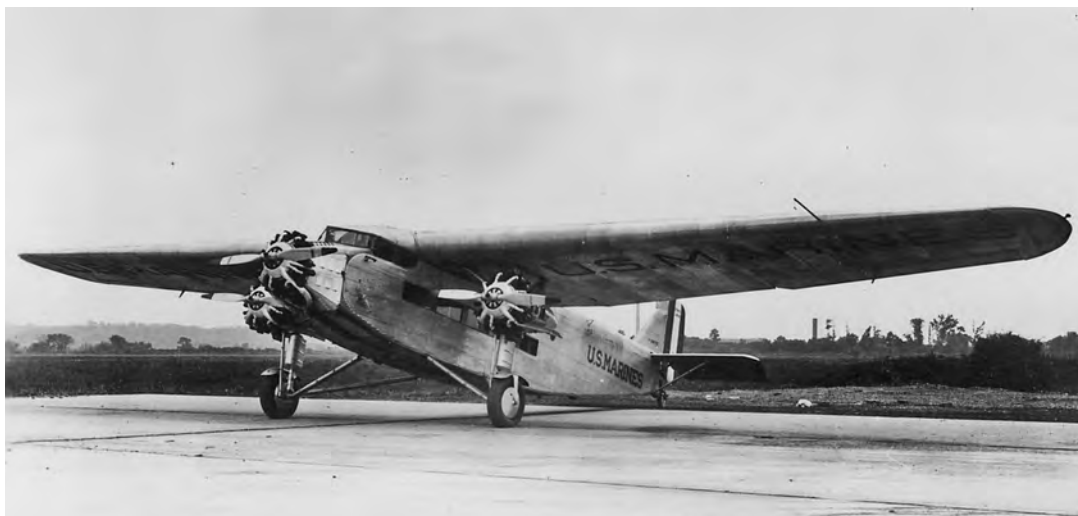


In mid-1929 all of the C-3As received an upgrade to 300-hp Wright R-975-1 engines and returned to service under the new designation C-9. The XC-3 was retained at Wright Field for test purposes until being removed from service in 1932. Through the mid-1930s, the seven C-9s spent most of their service careers assigned to one of six different USAAC airfields. The last example was retired from the Army inventory in 1936.

*Naval Variants:* In March 1927, the Navy purchased the fourth 4-AT-A on Ford's production line under the naval designation XJR-1. The aircraft arrived at NAS Anacostia in April 1928,



The XC-3 as seen while undergoing trials at Wright Field in 1928. Four similar aircraft with uprated engines were acquired in 1929 as the C-3A.



One of two JR-2s, Navy version of the Army C-9, ordered in 1928 and assigned to Marine squadron VJ-6M when delivered in 1929.

and following a year of testing, BuAer ordered two improved 4-AT-Es, equipped with 300-hp Wright J-6-9 engines, as the JR-2, both of which were assigned in 1929 to VJ-6M with the Second Marine Brigade in Nicaragua. In 1931, when the Navy adopted the “R” for transport designation, the two Marine JR-2s became RR-2s (Note: the XJR-1 was damaged beyond repair in 1930). Both continued in service until 1934.

## Ford C-4 (RR-3, -4, and -5)—1929

### Technical Specifications (C-4A)

Type: Staff and cargo transport.

Manufacturer: Stout Metal Airplane Div. of Ford Motor Co., Dearborn, Michigan.

Total military versions: 10 (5 USAAC; 5 USN/USMC).

Capacity: Crew of two plus 13 passengers or 3,000 lbs. of cargo.

Powerplants: Three 450-hp Pratt & Whitney R-1340-3 *Wasp* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 148-mph, cruise 115-mph; ceiling 18,050 ft.; range 500 mi.

Weights: 7,650 lbs. empty, 12,650 lbs. loaded.

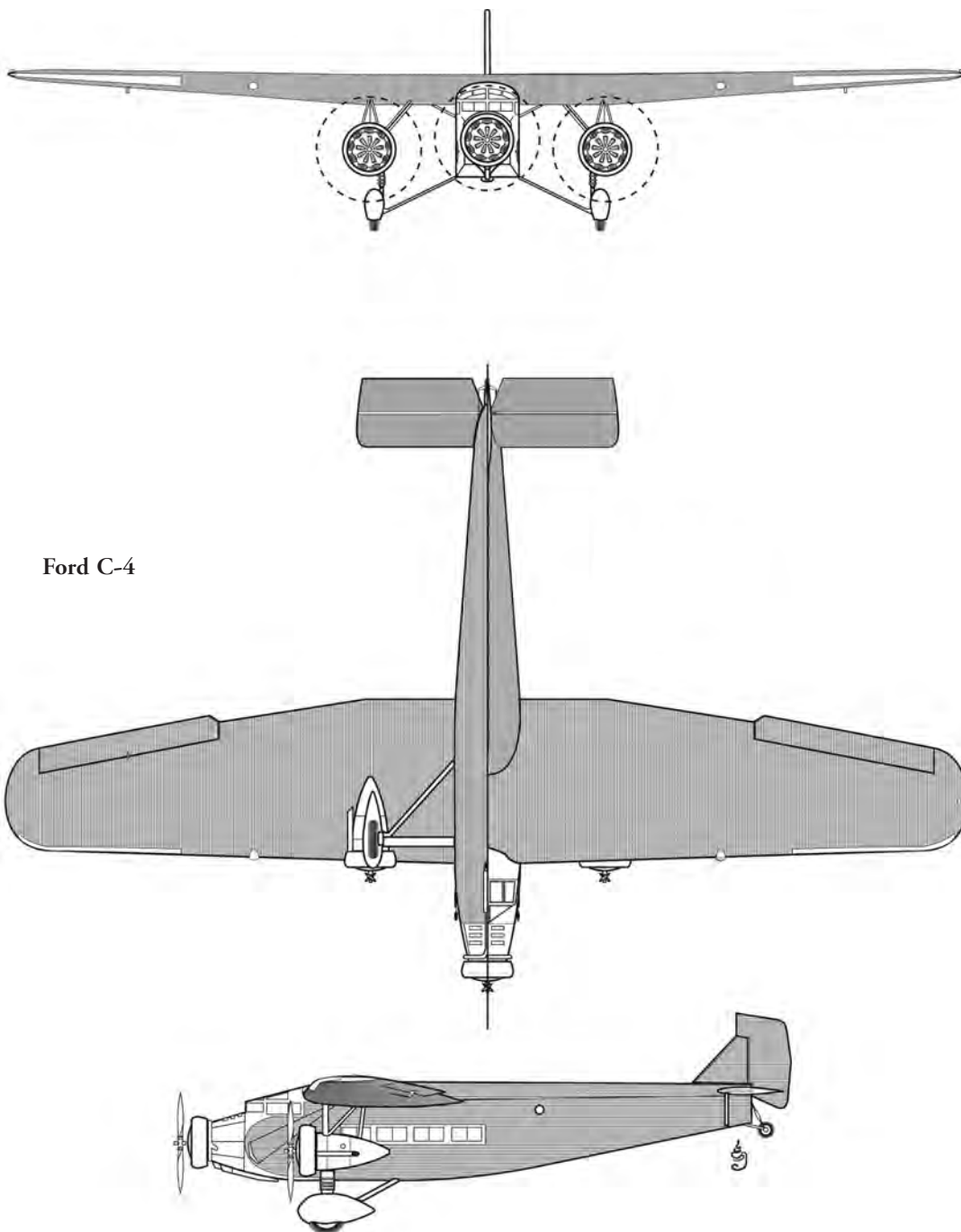
Dimensions: Span 77 ft. 10 in., length 50 ft. 3 in., wing area 835 sq. ft.

The Army purchased one Ford 5-AT-B for evaluation in mid-1929 under the designation C-4. A three-foot ten-inch increase in span and the added power of 450-hp *Wasp* engines gave the 5-AT-B a 30 percent improvement in useful load over the 4-AT-E. Ordered in late 1930, four improved Ford 5-AT-Ds having ring cowls and full wheel pants entered Air Corps service during 1931 as the C-4A. The C-4 was subsequently brought up to C-4A standard and in 1932, one of the C-4As became the C-4B when modified for installation of 475-hp R-1340-7 engines. In early 1934 all of the C-4As were called into service when the U.S. government temporarily gave the Air Corps responsibility for flying U.S. Mail routes, with one being destroyed in a crash in May. The C-4s remained in service as transports until being withdrawn in mid-1938.



Similar to the Army C-4A, this Navy RR-3 was one of three 5-AT-Cs acquired in 1930 as the JR-3 and redesignated RR-3 in 1931.

*Naval Variants:* BuAer purchased three Ford 5-AT-Cs in 1930 as the JR-3, one being retained by the Navy to be used as a staff transport at Pensacola and the other two going to Marine squadron VJ-6M. In 1931, when the Navy adopted the “R” for transport designation, the two remaining JR-3s (Note: one JR-3 crashed in Nicaragua in 1930) became RR-3s. Two improved Ford 5-AT-Ds entered naval service in 1932, one to the Navy as the RR-4 and one to VJ-6M



Ford C-4

(later VMJ-1) as the RR-5. All RRs had been withdrawn from the naval inventory by the end of 1937.

## Sikorsky C-6 (PS/RS)—1929

### Technical Specifications (C-6A)

Type: Amphibious staff and cargo transport.

Manufacturer: Sikorsky Aviation Div., United Aircraft Corp., Bridgeport, Connecticut.

Total military versions: 17 (11 USAAC; 9 USN/USMC).

Capacity: Crew of two plus six passengers or 1,500 lbs of cargo.

Powerplants: Two 450-hp Pratt & Whitney R-1340C *Wasp* 9-cylinder water-cooled engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 124-mph, cruise 109-mph; ceiling 19,400 ft.; range 750 mi.

Weights: 6,548 lbs. empty, 10,479 lbs. loaded.

Dimensions: Span 71 ft. 8 in., length 40 ft. 5 in., wing area 720 sq. ft.

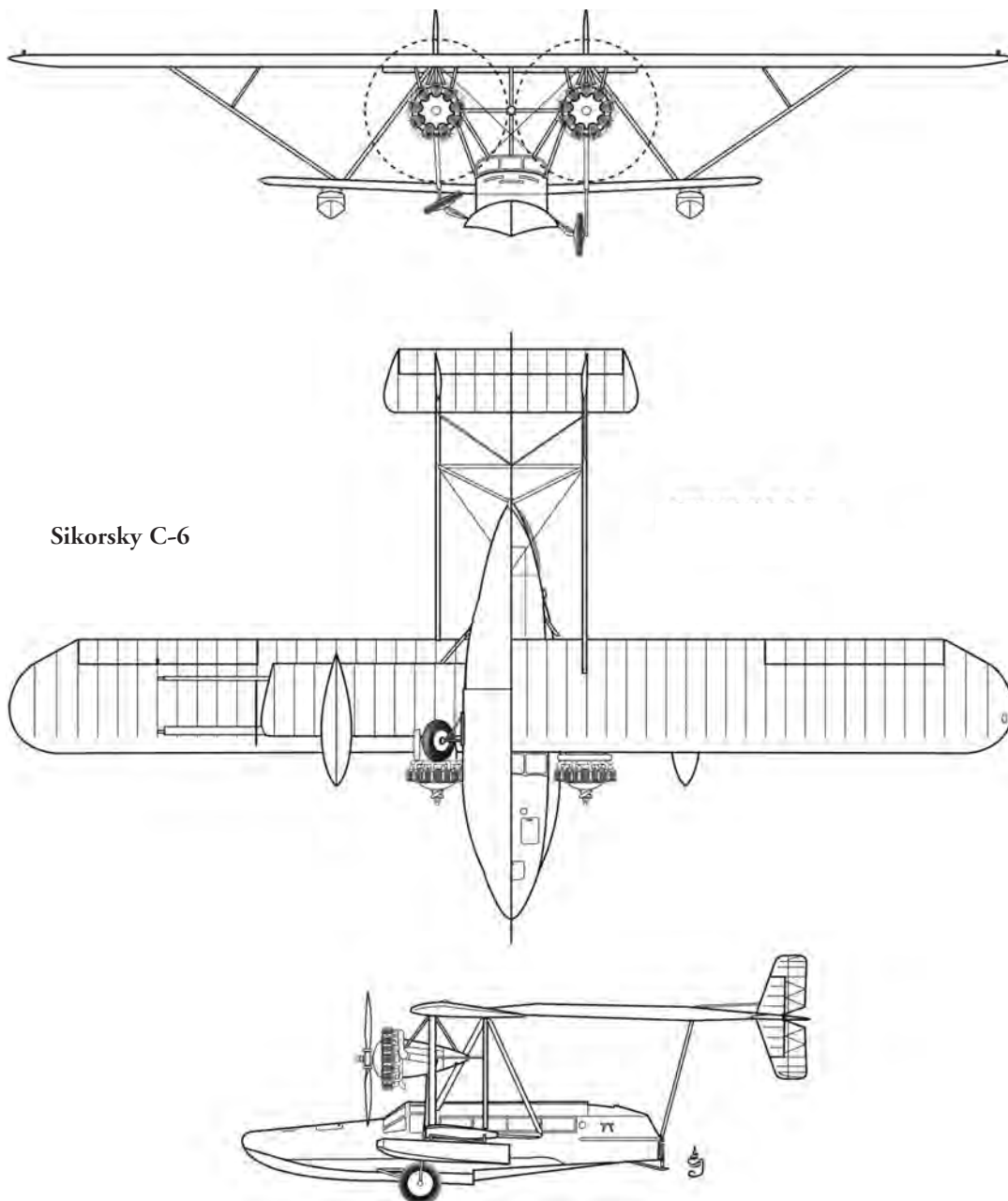
Humorously referred to as “a collection of parts flying in formation,” Igor Sikorsky’s S-38 made its first flight in June 1928 and a total of 120 in three major variants had been delivered for commercial and military use by the end of 1932. A sesquiplane of mixed metal and wooden construction, the S-38 utilized separate hull, wing, tailplane, and engine nacelle structures that were braced together by a profusion of struts. For water operations, the main landing gear manually retracted to the sides of the hull. The Army purchased one S-38A (400-hp R-1340-1 engines) in late 1929 as the XC-6 in contemplation of operating amphibians from coastal bases



The Army procured ten Sikorsky S-38B amphibians in 1930 as the C-6A for staff and logistics duties at coastal and island bases.

for both observation and transportation. In 1930, following a year of evaluations, the Army ordered 10 S-38Bs (450-hp R-1340C engines) that entered Air Corps service as the C-6A. After testing, the XC-6 was assigned to Bolling Field, Washington, D.C., as a staff transport; the 10 C-6As were distributed among both U.S. coasts, Albrook Field in the Canal Zone, Wheeler Field in Hawaii, and Nichols Field in the Philippines. The Air Corps grounded and removed all C-6s from service in 1933 after the crash of one aircraft was attributed to structural fatigue.

*Naval Variants:* The Navy acquired two S-38As in 1929 as the PS-2, followed by four S-



Sikorsky C-6





**One of three S-41s delivered to the Navy in 1933 as the RS-1. The S-41 was 10 percent larger than the S-38 and lifted half again the useful load.**

38Bs between 1929 and 1932 as the PS-3. Naval versions initially carried machine guns in the bow and stern; however, all armament was subsequently removed and the aircraft re-designated transports as the RS-2 and -3, respectively. One RS-3 served with Marine squadron VJ-6M at MCAS Quantico, Virginia and the Expeditionary Force in Nicaragua. BuAer also procured three S-41s in 1933 as the RS-1. Though very similar in appearance to the S-38, the S-41 was in fact a 10 percent scale-up having no lower wing and almost double the useful load. Two RS-1s served as Navy staff transports and a third with the Marines in Haiti.

## **Fairchild C-8, F-1, UC-61D, and -96 (JQ/ RQ and R2Q)—1928**

### **Technical Specifications (C-8A)**

Type: Staff, cargo, and photographic transport.

Manufacturer: Fairchild Aircraft Mfg. Co., Farmingdale, New York.

Total military versions: 16 (21 USAAC/AAF; 1 USN).

Capacity: Crew of one or two plus six passengers or 1,200 lbs. of cargo.

Powerplant: One 410-hp Pratt & Whitney R-1340-1 Wasp 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

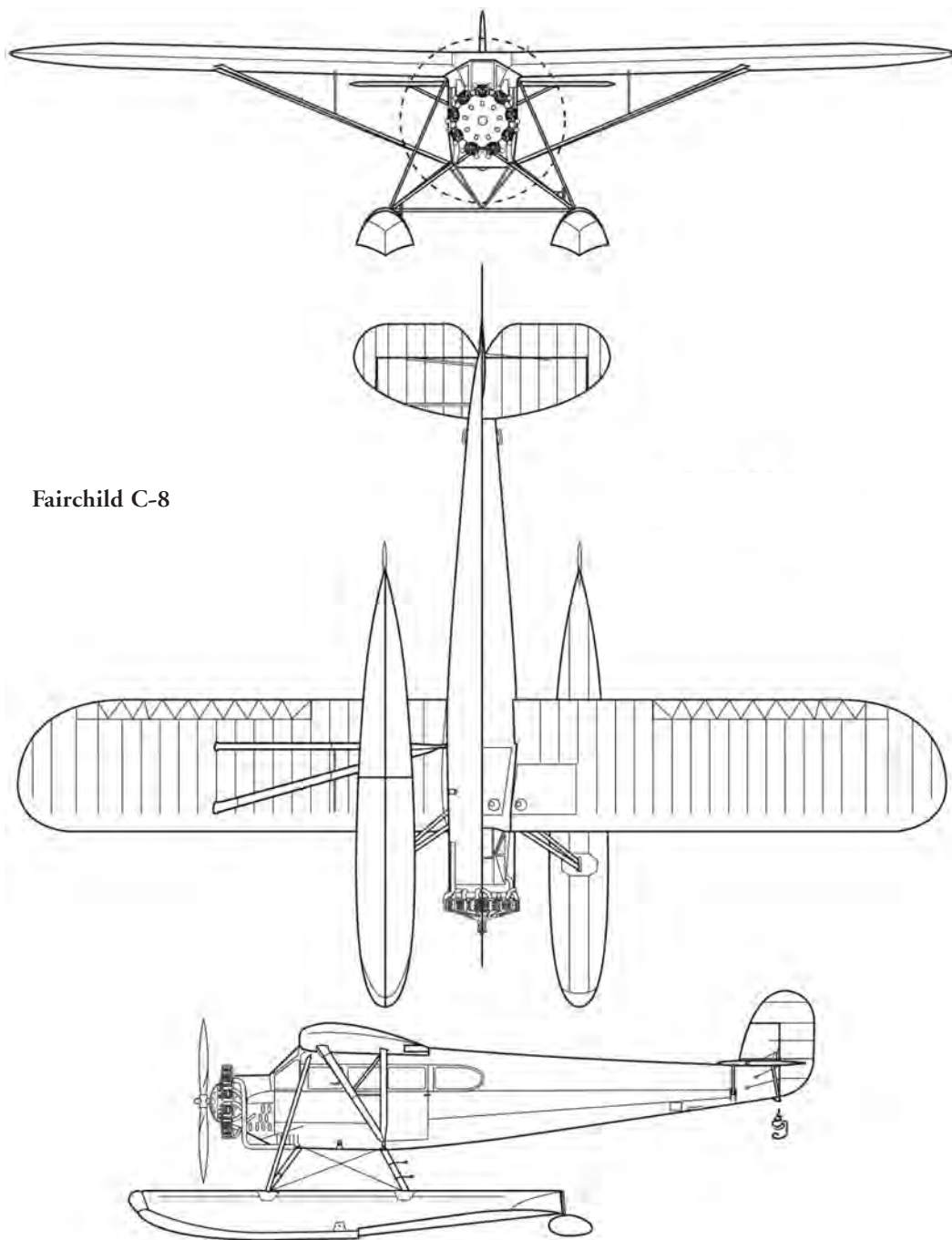
Performance: Max. speed 138-mph, cruise 110-mph; ceiling 17,500 ft.; range 900 mi.

Weights: 3,168 lbs. empty, 5,500 lbs. loaded.

Dimensions: Span 50 ft., length 33 ft., wing area 310 sq. ft.

Fairchild's FC-2 series of high-wing cabin monoplanes had established themselves as photographic and good short-field (bush) airplanes by the time the Army acquired an FC-2W1 in 1929 as the XC-8. The FCs were characterized by a boxy, space-efficient fuselage of fabric-covered, steel tube construction and built-up wooden wings having large trailing-edge flaps. Also, for storage or ground transportation, the wings hinged to fold back from the root attachment points. After being fitted with aerial mapping camera equipment in 1930, the XC-8 was

re-designated XF-1 (photo-reconnaissance). In 1930 the Army ordered eight more FC-2W1s that entered service as the C-8, and one C-8 fitted with mapping cameras became the YF-1. Six more almost identical aircraft were ordered in 1931 as the C-8A, which alternately operated as F-1As when equipped with cameras. C-8s/F-1s saw extensive service with the Air Corps mapping air routes and operating out of unimproved areas all through the 1930s on into World War II. In



Fairchild C-8





**C-8 at Wright Field in 1930 after being modified for photographic work. Saw extensive service in mapping air routes.**

1942 the AAF impressed three civilian Fairchild Model 51As into service during 1942 as the UC-61D. Model 51As, built by Fairchild of Canada, had appeared in the early 1930s as improved FC-2s powered by 350-hp Pratt & Whitney R-985 engines. Why AAF Material Command chose a designation conflicting with Fairchild Model 24s is not clear. The same year, the AAF also impressed three American-built Fairchild Model FC-2Ws (420-hp Pratt & Whitney R-1340 engines) as the UC-96. Built around 1928, these may have been the oldest aircraft on the AAF inventory during World War II.

*Naval Variants:* The JQ and J2Q/R2Q were the same aircraft with different engines. As part of its evaluation of civil transports, the Navy acquired one Fairchild Model FC-2 in early 1928 as the XJQ-1. After a year of trials at Anacostia, the aircraft was refitted with a 450-hp Pratt & Whitney *Wasp* engine (though apparently not with the larger wings of the FC-2W) and re-evaluated as the XJ2Q-1. In 1931 it was re-designated XR2Q-1.

## Curtiss C-10—1929

### Technical Specifications (XC-10)

Type: Experimental flying testbed transport.

Manufacturer: Curtiss Aeroplane & Motor Co., Garden City and Buffalo, New York.

Total military versions: 1 (USAAC).

Capacity: One pilot.

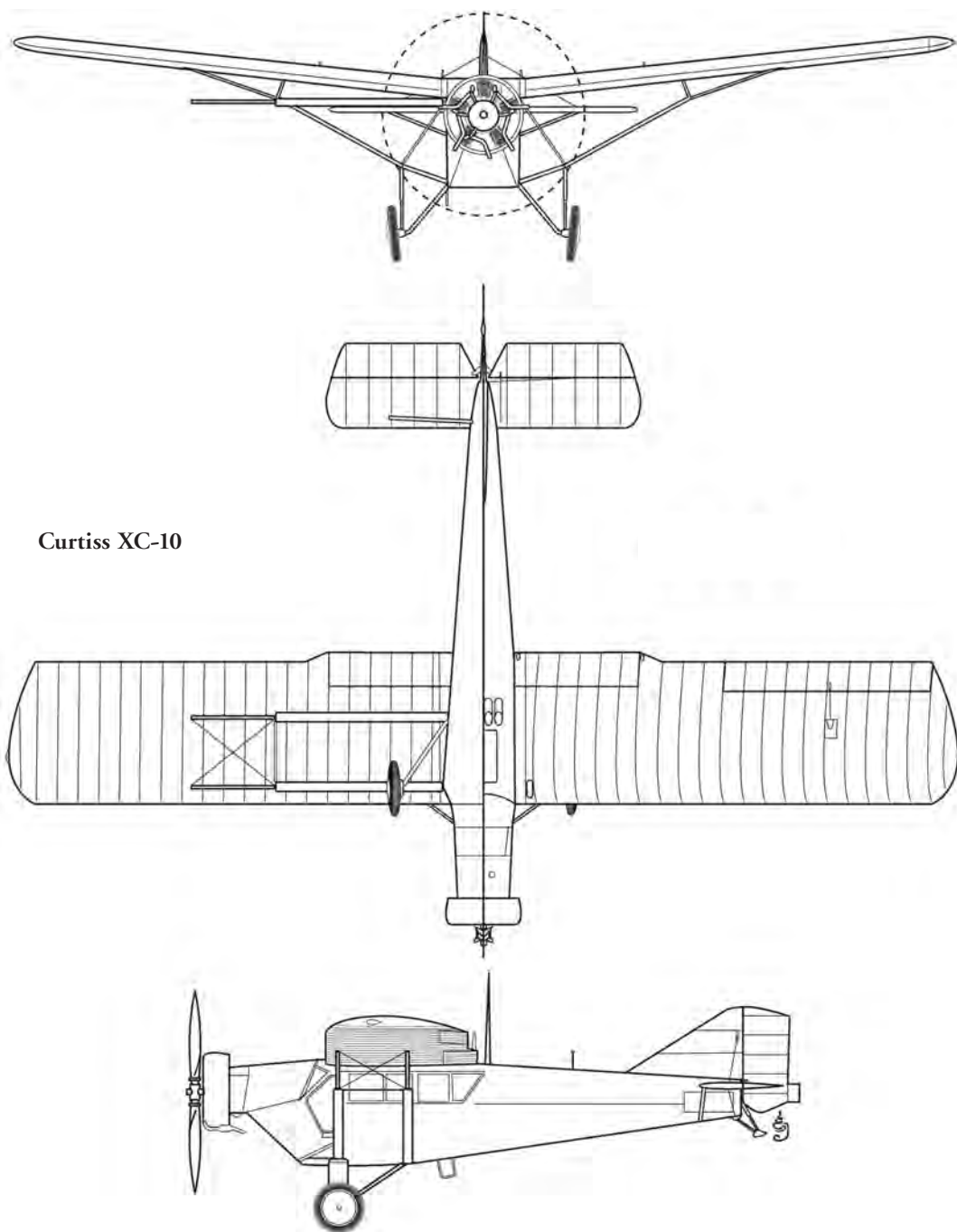
Powerplant: One 110-hp Warner R-420-1 *Scarab* 7-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 90-mph, cruise 70-mph; ceiling 12,000 ft.; range 300 mi.

Weights: 1,490 lbs. empty, 2,450 lbs. loaded.

Dimensions: Span 41 ft., length 25 ft. 1 in., wing area 310 sq. ft.

The Army purchased one civilian Curtiss Robin W (Warner engine) in 1929 to perform some of the earliest experiments in unpowered, radio-controlled flight. Designated XC-10 upon delivery, the aircraft received extensive modifications in preparation for the test program: the engine was relocated forward on a higher thrust line, wing dihedral increased to 4.5-degrees, tail and control surfaces enlarged to permit control in slower flight regimes, and radio receivers



**Curtiss XC-10**



**The XC-10, a much modified Curtiss Robin, was used in 1929 and 1930 to conduct the earliest experiments in remote-controlled flight.**

installed that actuated the control servos. The aircraft was subsequently flown a total of 100 hours in a test program conducted during 1929 and 1930. The experience learned was later incorporated into the Air Corps' radio-controlled target drone programs of the late 1930s.

## **Consolidated C-11 and C-22 —1931**

### **Technical Specifications (Y1C-22)**

Type: Staff and cargo transport.

Manufacturer: Consolidated Aircraft Corp., Buffalo, New York.

Total military versions: 4 (USAAC).

Capacity: One pilot plus seven passengers or 1,500 lbs. of cargo.

Powerplant: One 575-hp Wright R-1820-1 *Cyclone* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 180-mph, cruise 153-mph; ceiling 18,000 ft.; range 675 mi.

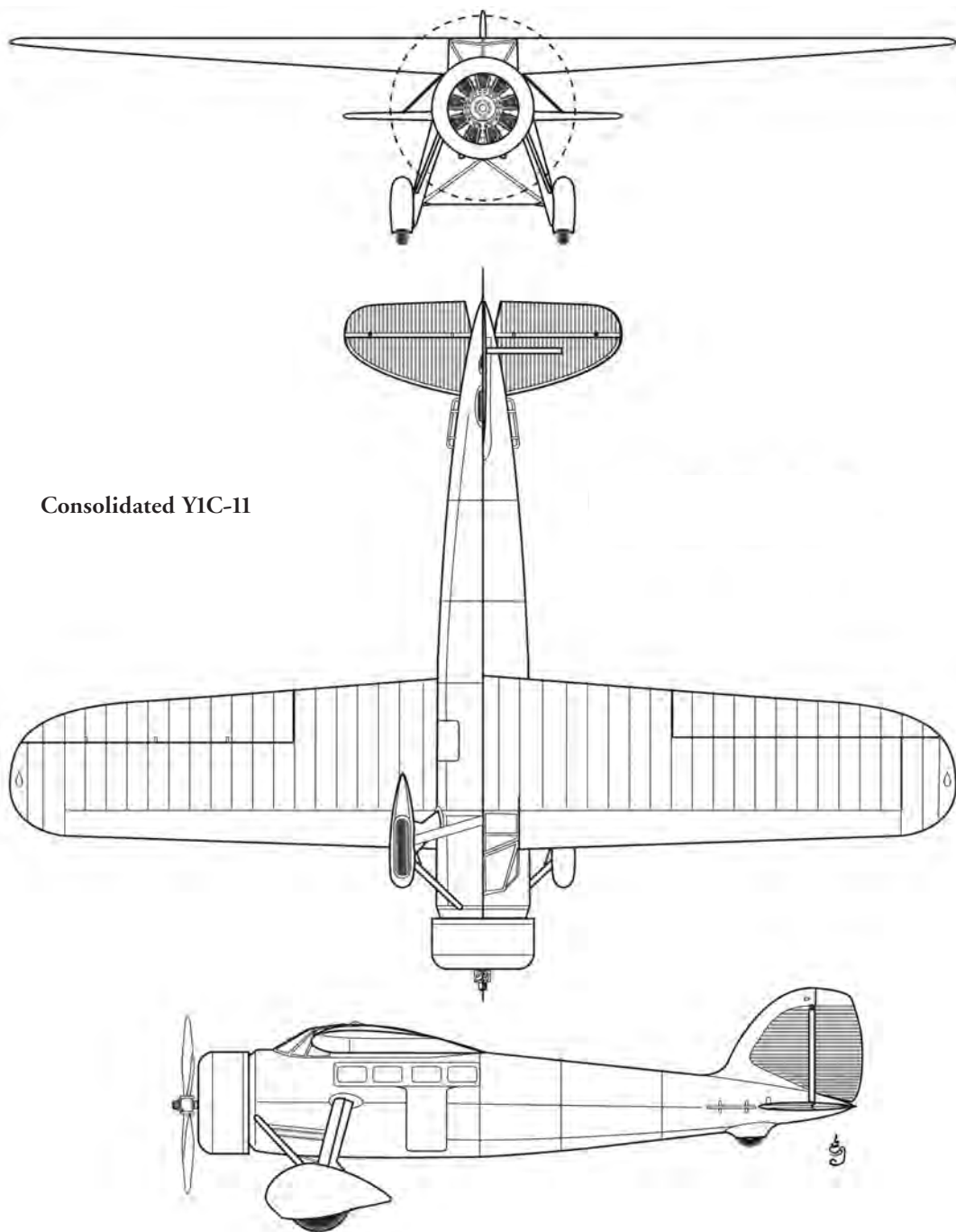
Weights: 3,326 lbs. empty, 5,600 lbs. loaded.

Dimensions: Span 45 ft., length 31 ft. 9 in., wing area 314 sq. ft.

Consolidated introduced its Model 17 Fleetster in 1929 to meet a New York, Rio, and Buenos Aires Line requirement for a short-haul airliner to be used on South American coastal routes. It emerged as a high-wing monoplane powered by a 575-hp Pratt & Whitney R-1860-1 *Hornet* engine, characterized by a very clean all-metal semi-monocoque fuselage structure and a wooden

wing skinned in plywood veneer. The Army acquired one example in 1930, designated Y1C-11, as a staff transport for the Assistant Secretary of War.

In 1931 three Model 17-2s, which differed in having Wright *Cyclone* engines, entered Air Corps service as the Y1C-22. When subsequently upgraded to Model 17-2 standards, the Y1C-11 became the Y1C-11A. During their service career, these aircraft were based variously at Bolling



**Consolidated Y1C-11**



The three Y1C-22s accepted in 1931 differed from the Y1C-11 in having *Cyclone* engines rather than *Hornets*. They saw extensive use as VIP transports during the mid-1930s.

Field in Washington, D.C., and Wright Field in Dayton, Ohio, where they saw extensive use as VIP transports.

There were no naval variants of the Model 17 transport, though one armed version, listed as the Model 18, was evaluated as a dive-bomber at NAS Anacostia, Maryland from 1932 to 1933 as the XBY-1. No production resulted.

## Lockheed C-12, C-17, and UC-101—1931

### Technical Specifications (Y1C-12)

Type: Staff and cargo transport.

Manufacturer: Lockheed Aircraft Div. of Detroit Aircraft Corp., Burbank, California and Detroit, Michigan.

Total military versions: 3 (USAAC).

Capacity: One pilot plus five passenger or 1,100 lbs. of cargo.

Powerplant: One 500-hp Pratt & Whitney R-1340C *Wasp* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 185-mph, cruise 165-mph; ceiling 15,000 ft.; range 725 mi.

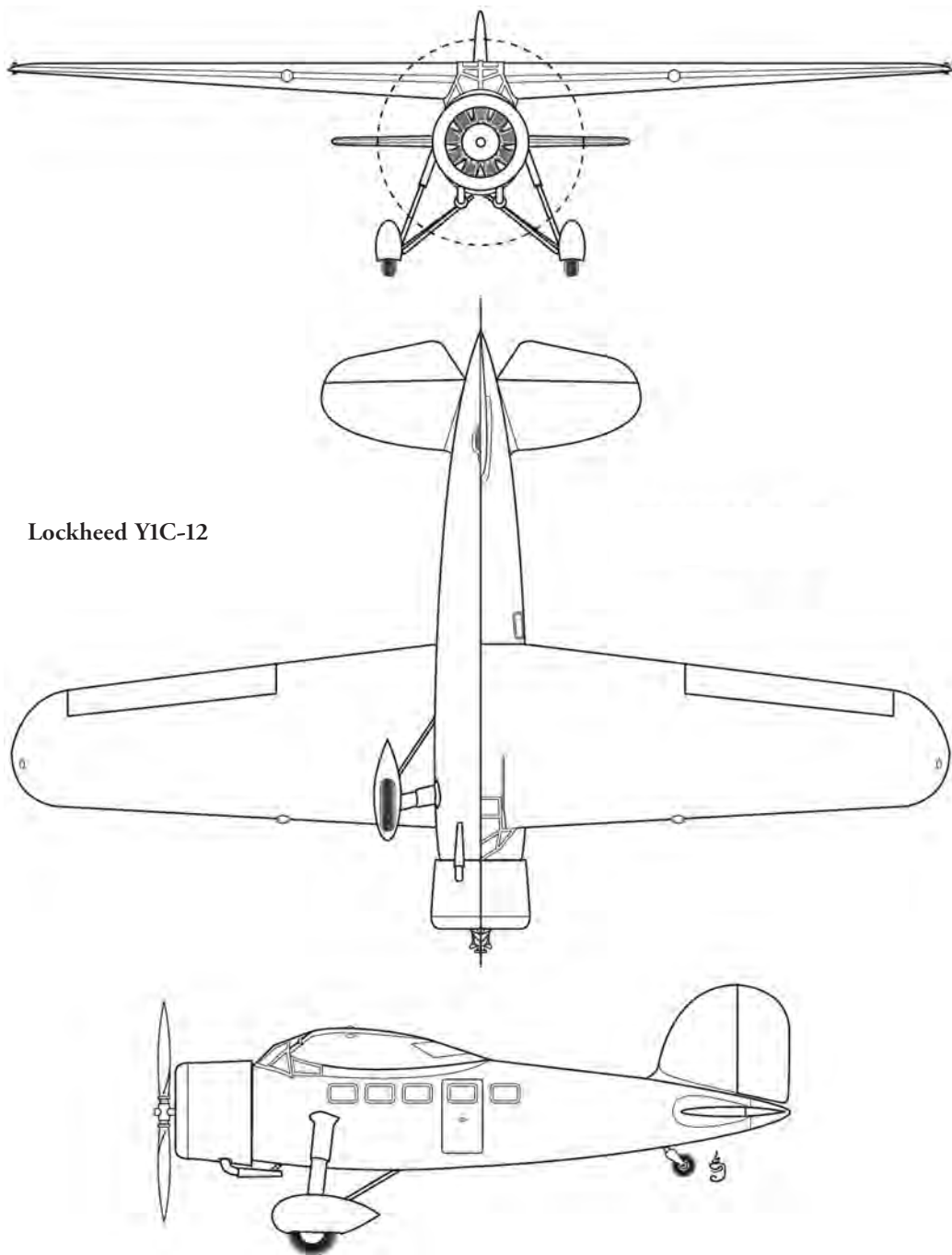
Weights: 2,565 lbs. empty, 4,500 lbs. loaded.

Dimensions: Span 41 ft., length 27 ft. 6 in., wing area 259 sq. ft.

Designed by John Northrop and Gerard Vultee, the Lockheed Vega 1 made its first flight in July 1927 and was followed by a succession of improved Vega models until production ceased in 1931. The Vegas, featuring a molded plywood fuselage and a fully cantilevered, shoulder-



mounted wooden wing, were among the most aerodynamically clean aircraft of their day. Though too small to be a practical airliner, the Vegas did establish many speed and distance records, most notably a Vega 5B named *Winnie Mae* that Wiley Post flew around-the-world in 1931. The Army purchased two Vegas in 1931, a Vega 5CDL-1 having an all-metal fuselage as the Y1C-12 and a Vega 5CDL-1B with cantilevered landing gear as the Y1C-17. Posting a top speed of 221-



Lockheed Y1C-12





A civilian Vega impressed into military service as the UC-101 and repainted in wartime colors. Note retrofit of variable-pitch propeller.

mph, the Y1C-17 was the fastest aircraft in the Air Corps inventory at the time. One civilian Vega 5C was impressed into the Army Air Force in 1942 as the UC-101 and served throughout World War II.

### C-13 (not assigned)

## General Aviation (Fokker) C-14 and C-15—1931

### Technical Specifications (C-14)

Type: Staff and cargo transport and air ambulance.

Manufacturer: General Aviation Mfg. Corp., Hasbrouck Heights, New Jersey.

Total military versions: 20 (USAAC).

Capacity: One pilot plus six passengers or 1,650 lbs. of cargo.

Powerplant: One 525-hp Wright R-1750-13 *Cyclone* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

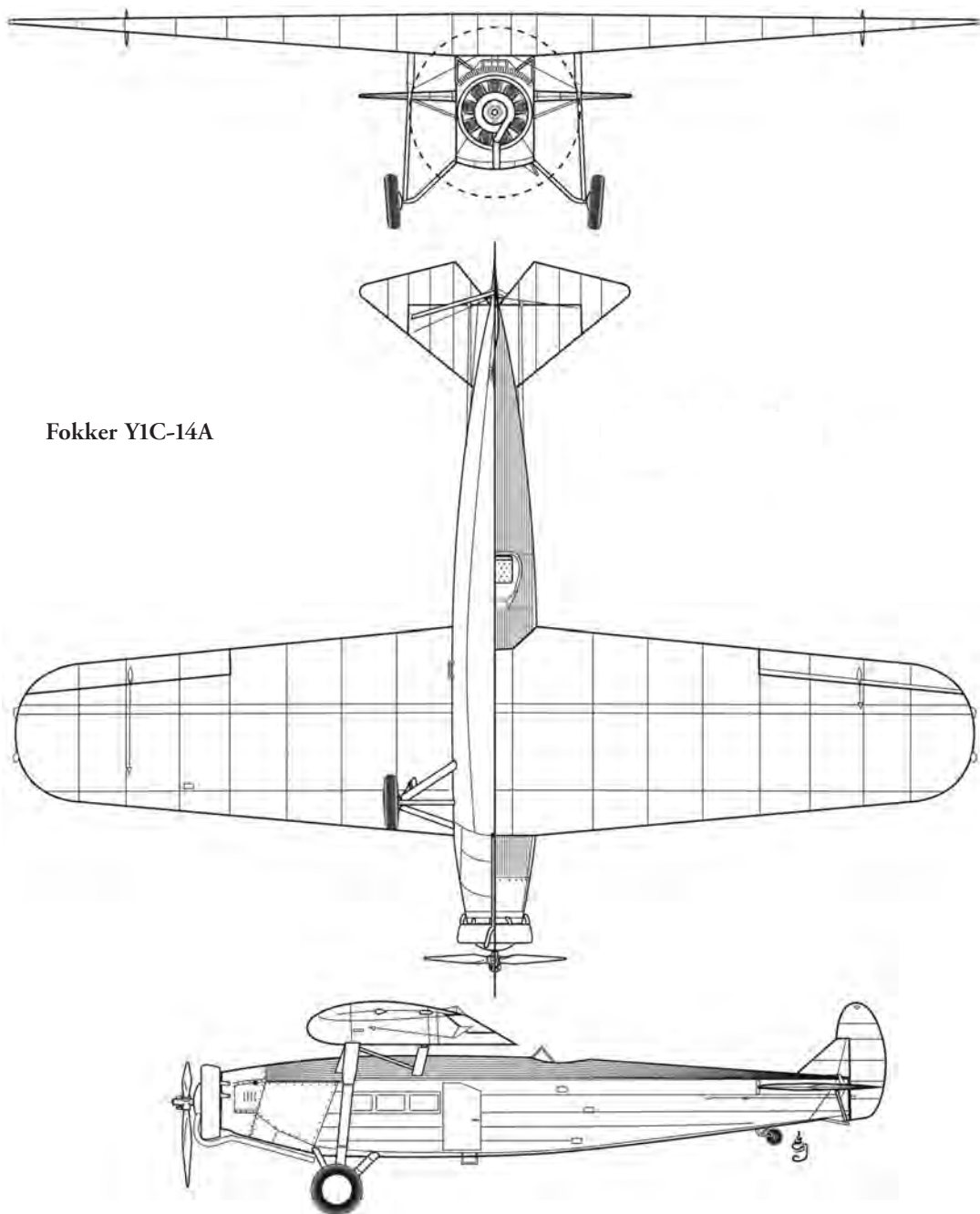
Performance: Max. speed 137-mph, cruise 120-mph; ceiling 14,500 ft.; range 690 mi.

Weights: 4,346 lbs. empty, 7,200 lbs. loaded.

Dimensions: Span 59 ft. 5 in., length 43 ft. 3 in., wing area 551 sq. ft.

Twenty aircraft purchased by the Army in 1931 as the Y1C-14 were essentially identical to the Dutch-built Fokker F.XIV flown for the first time in 1929. By this time the Atlantic Aircraft Div. of Fokker had been absorbed as a subsidiary of General Motors Corp., operating as General Aviation Mfg. Corp. The F.XIV featured a fabric-covered, steel tube fuselage structure and an

all-metal wing, parasol-mounted to the upper fuselage on cabane struts. Cargo or passengers were carried in a fuselage cabin while the pilot sat in an open cockpit aft of the wing. The last two Y1C-14s delivered were re-designated after engine changes: one as the Y1C-14A after receiving a 575-hp Wright R-1820E-7 and three-bladed propeller and the other as the Y1C-14B after being fitted with a 525-hp Pratt & Whitney R-1690-5. A third Y1C-14 became the Y1C-15 in 1932 when converted to an air ambulance configuration with three medical litters and support



**Fokker Y1C-14A**



**The Y1C-14B, at Wright Field in 1932, was re-designated after being refitted with a Pratt & Whitney R-1690 engine.**

equipment. Once in service, the Y1 service test prefix was deleted from the designations of all C-14 variants and the sole C-15.

The eighteen C-14s and the C-14A were assigned general transport duties and distributed among the nine major Air Corps bases. Beginning in 1935, the C-14B became a flying testbed at Wright Field in the development of an automatic landing system (i.e., a Sperry “gyro pilot” maintaining three-axis and throttle control via radio beacons from approach to touchdown). The C-14s and C-15 operated throughout the 1930s until replaced by newer transport types.

## **General Aviation (Fokker) C-16 — 1931**

### **Technical Specifications (Y1C-16)**

Type: Amphibious staff and cargo transport.

Manufacturer: General Aviation Mfg. Corp., Hasbrouck Heights, New Jersey.

Total military versions: 1 (USAAC).

Capacity: Crew of two plus six passengers or 1,500 lbs. of cargo.

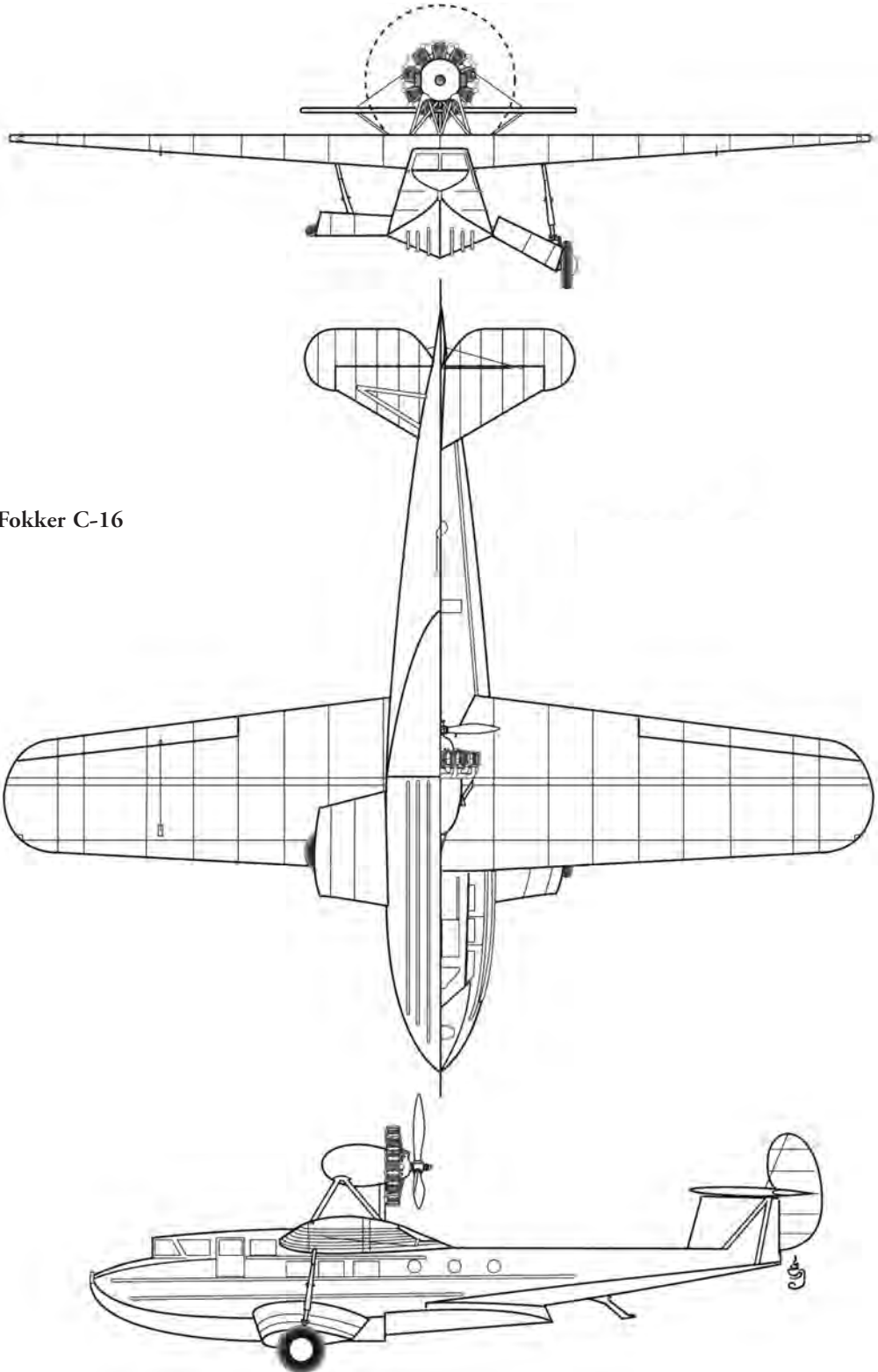
Powerplant: One 525-hp Pratt & Whitney R-1690-1 *Hornet* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 125-mph, cruise 110-mph; ceiling (not reported); range 400 mi.

Weights: 4,346 lbs. empty, 6,350 lbs. loaded.

Dimensions: Span 59 ft., length 45 ft., wing area (not reported).

The Atlantic-Fokker F.XIa “Flying Yacht,” designed by Alfred A. Gassner in the U.S., was introduced in 1929 as a small airliner and executive transport. Basic structure comprised mating a set of all-metal F.XIV wings to an aluminum-clad boat hull, with a pusher engine strut-mounted over the wing center-section. The prototype featured retractable sponsons that also housed the main wheels, but production versions appeared with side-mounted retractable landing gear struts



Fokker C-16



One military adaptation of Fokker's F.XIa Flying Yacht was evaluated at Wright Field in 1931 as the YIC-16.

and fixed stabilizing floats. The Army acquired one example for evaluation in 1931 as the YIC-16 (later changed to C-16). The C-16 was the second type of amphibian to be tested by the Air Corps (see Sikorsky C-6, above) for the purpose of observation and transportation at coastal and island bases.

### Boeing C-18 —1931

Technical Specifications (YIC-18)

Type: Staff and cargo transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 1 (USAAC).

Capacity: One pilot plus six passengers or 1,500 lbs. of cargo.

Powerplant: One 575-hp Pratt & Whitney R-1860-7 *Hornet* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

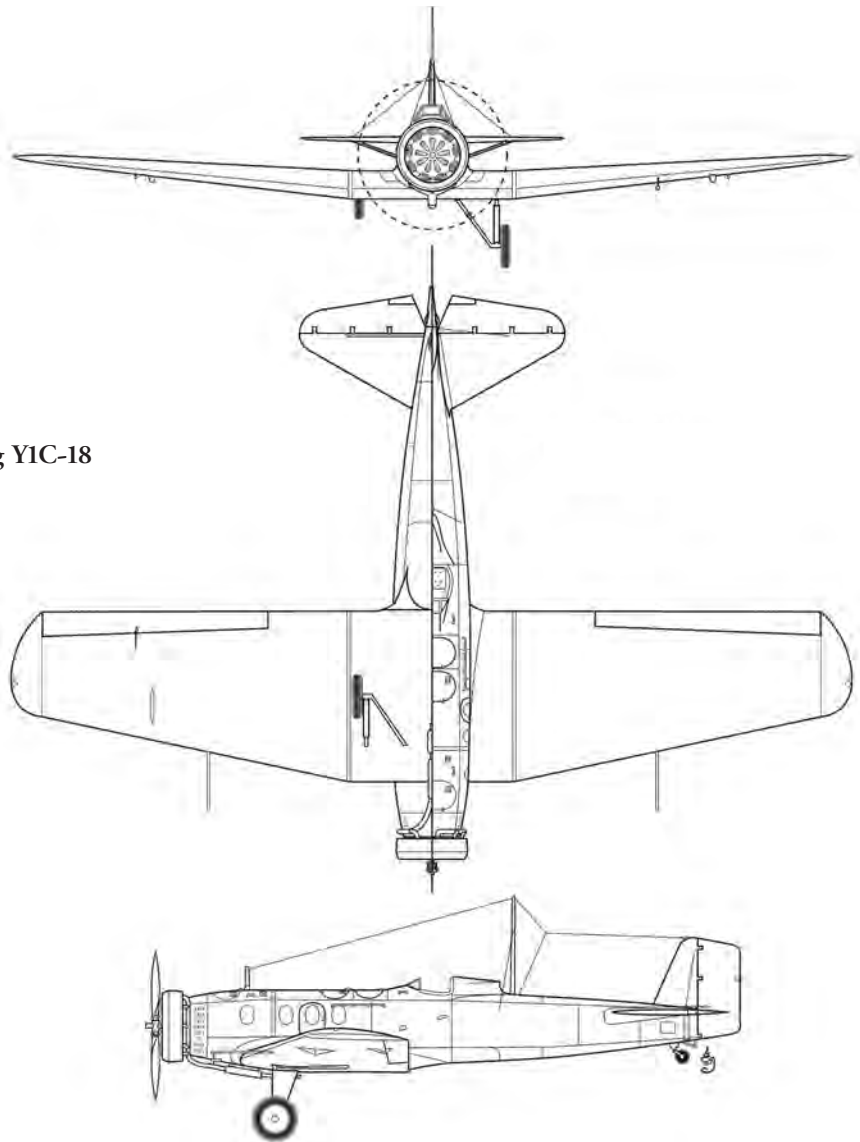
Performance: Max. speed 158-mph, cruise 135-mph; ceiling 14,700 ft.; range 575 mi.

Weights: 4,500 lbs. empty, 8,000 lbs. loaded.

Dimensions: Span 59 ft. 1 in., length 41 ft. 10 in., wing area (not reported).

When the Boeing model 200 "Monomail" appeared in 1930, it represented the state-of-the-art in aircraft design, featuring a very streamlined, all-aluminum airframe along with a cantilevered low wing and retractable landing gear. Passengers or cargo were located in the forward fuselage while the pilot sat in an open cockpit aft of the cabin. In 1931 the Army gave Boeing an order for a single model 221 (passenger version of model 200) under the assigned designation YIC-18. In the interval, Boeing loaned the Air Corps a company prototype (no serial number assigned) for preliminary evaluations at Wright Field, Ohio. After testing, however, Air Corps officials decided against procurement and canceled the order before the YIC-18 could be delivered.

**Boeing Y1C-18**



The model 221 Monomail prototype loaned to the Air Corps in 1931 as the Y1C-18. After testing, the Air Corps canceled the order and returned the prototype to Boeing.



## Northrop C-19 — 1930

Technical Specifications (Y1C-19)

Type: Staff and cargo transport.

Manufacturer: Northrop Corp., Burbank, California.

Total military versions: 3 (USAAC).

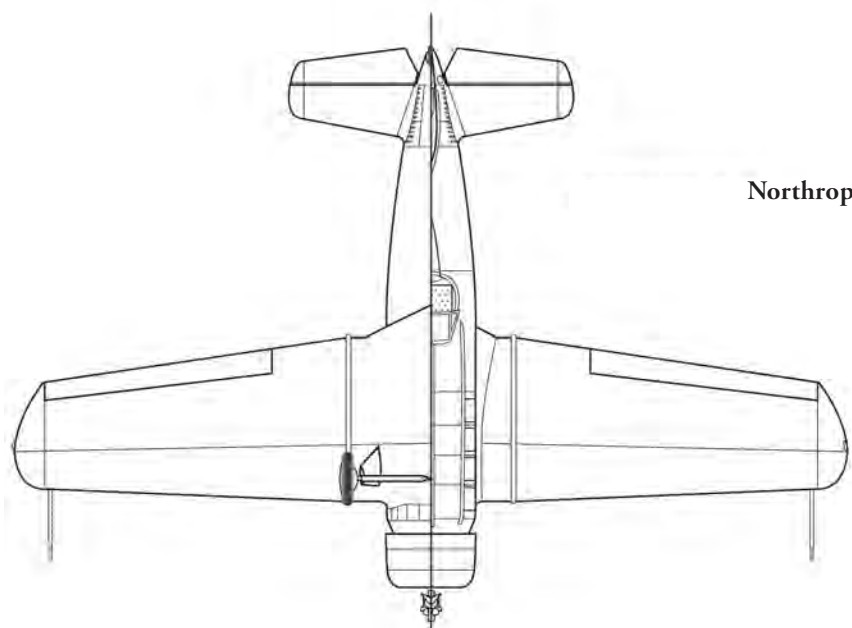
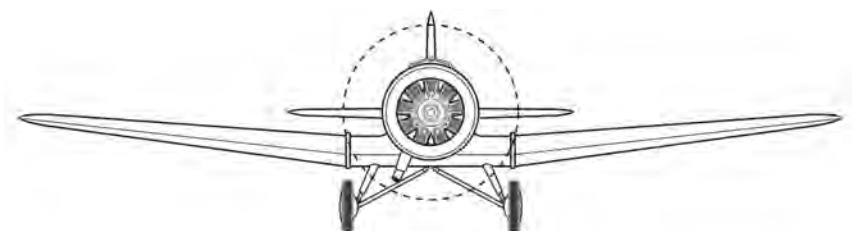
Capacity: One pilot plus four passengers or 1,000 lbs. of cargo.

Powerplant: One 450-hp Pratt & Whitney R-1340-7 *Wasp* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

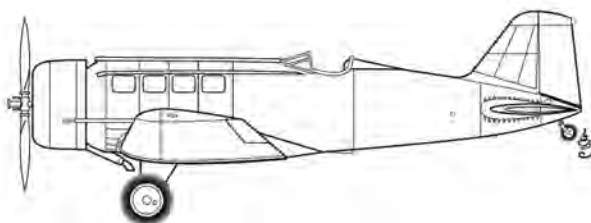
Performance: Max. speed 170-mph, cruise 155-mph; ceiling 19,000 ft.; range 650 mi.

Weights: 2,590 lbs. empty, 4,700 lbs. loaded.

Dimensions: Span 41 ft. 10 in., length 28 ft. 5 in., wing area 295 sq. ft.



Northrop YC-19





**One of two Alphas delivered in 1931 as the YIC-19. The first example, designated YC-19, was tested in 1930.**

A highly innovative design concept like Boeing's model 200 except for its fixed landing gear, the first prototype Northrop Alpha was flown to Wright Field in the summer of 1930 for Air Corps evaluation. In the design of the Alpha, John Northrop introduced the rugged, multicellular wing structure that would later appear on the Douglas DC-1 and DC-2. Three Alphas ordered from Northrop by the Army were delivered in 1931, one as the YC-19 and two as the YIC-19, which differed only as to funding source. From 1931 to 1933, all three were based at Bolling Field, Washington, D.C., where they were used as fast VIP transports for Army Generals and War Department officials. Following a fatal crash of one YIC-19 in March 1933, the two remaining aircraft were transferred to Air Corps bases as hacks and utility transports. In mid-1939, both planes were grounded and sent to mechanic schools for static use.

### **General Aviation (Fokker) C-20—1930**

Technical Specifications (YC-20)

Type: Staff and cargo transport.

Manufacturer: General Aviation Mfg. Corp., Hasbrouck Heights, New Jersey.

Total military versions: 1 (USAAC).

Capacity: Crew of two plus 30 passengers or 9,340 lbs. of cargo.

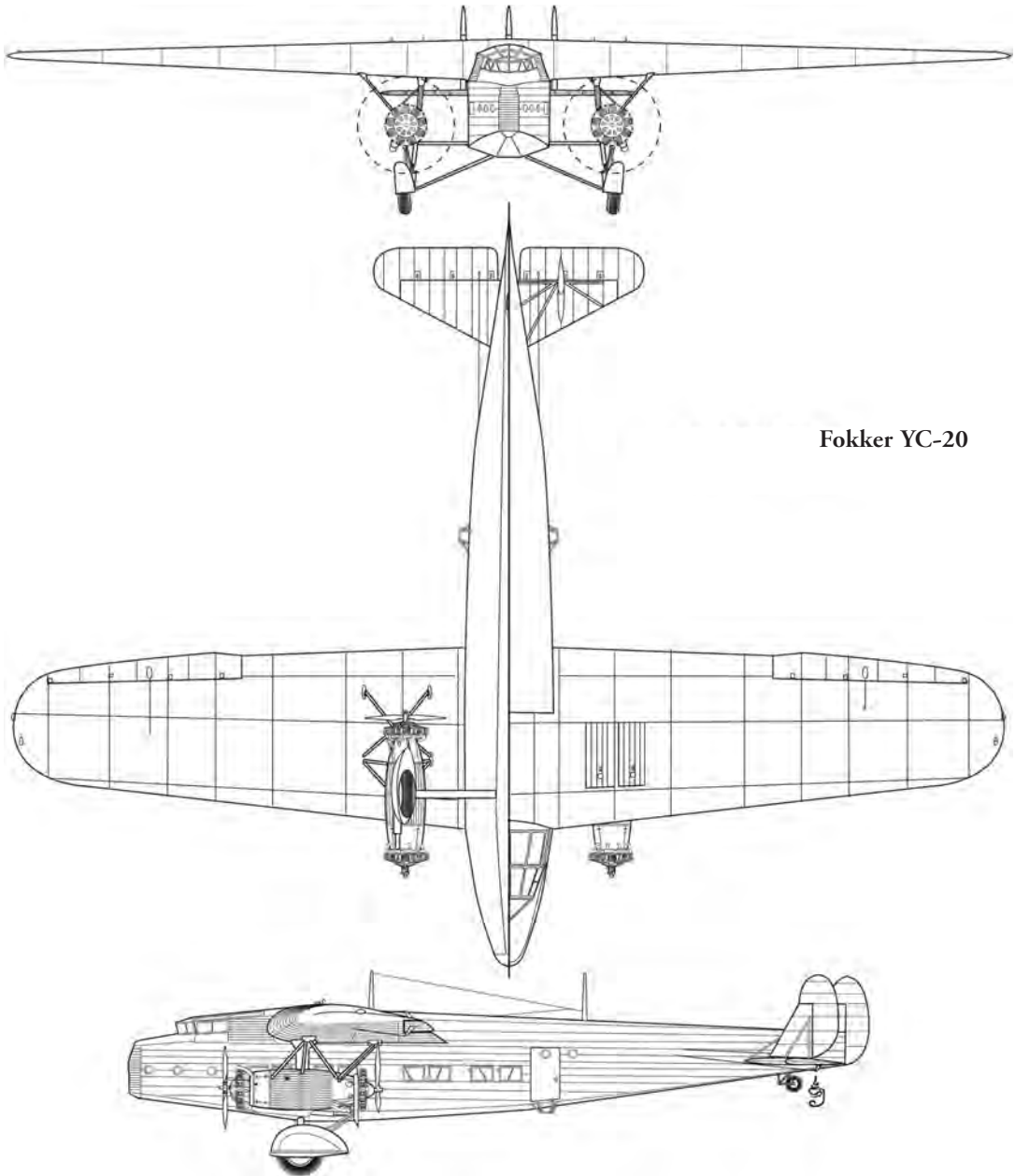
Powerplants: Four 525-hp Pratt & Whitney R-1860-1 *Hornet* 9-cylinder air-cooled radial engines driving two (front) and a three-bladed (back) Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 140-mph, cruise 120-mph; ceiling 13,500 ft.; range 740 mi.

Weights: 4,346 lbs. empty, 22,500 lbs. loaded.

Dimensions: Span 59 ft., length 45 ft., wing area (not reported).

Intended for the emerging American airliner market, the Atlantic Division of Fokker developed the four-engine F.32 in 1929 using a similar high-wing layout and mixed metal and wood structural methods seen on the C-2, -5, and -7 as reported above. To avoid frontal drag, the

**Fokker YC-20**

engines were mounted in tandem pairs on nacelles suspended from each wing. General Aviation, Fokker's corporate successor, loaned the Air Corps one of its F.32s in 1930 for evaluation purposes. It was the largest type of aircraft to be tested since the Barling XNBL-1 bomber of 1923. Though receiving the military designation YC-20, ownership was retained by the manufacturer and no Army serial number assigned. Flight trials revealed that the tandem arrangement caused the rear pair of engines to overheat and lose propeller efficiency due to airflow turbulence generated by the forward pair. The aircraft was returned to the manufacturer after brief testing.



Seen here in company markings, the Air Corps accepted an F-32 on consignment in 1930 for evaluation as the YC-20 but later returned it.

### C-21, C-26, C-29, and OA-3 (see Douglas RD in Part B)

### Lockheed C-23, C-25, and UC-85 (RO)—1931

Technical Specifications (Y1C-23)

Type: Staff transport.

Manufacturer: Lockheed Aircraft Div., Detroit Aircraft Corp., Burbank, California.

Total military versions: 3 (2 USAAC; 1 USN).

Capacity: One pilot plus three passengers.

Powerplant: One 500-hp Pratt & Whitney R-1340-9 *Wasp* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard variable-pitch metal propeller.

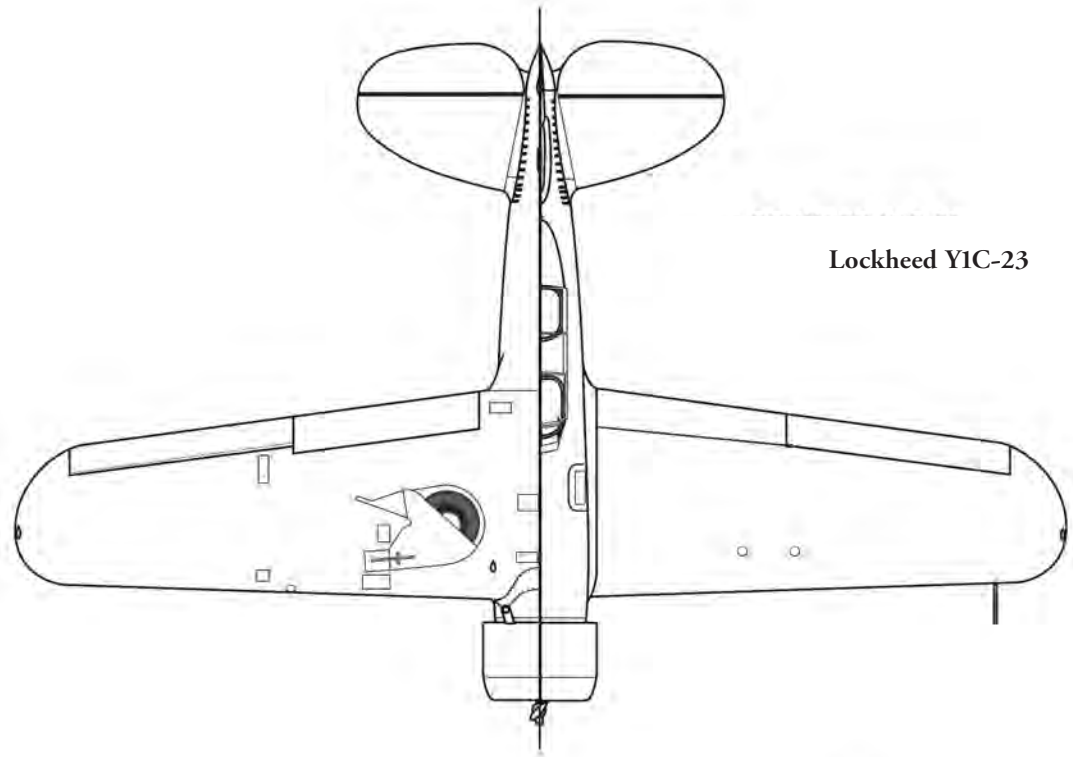
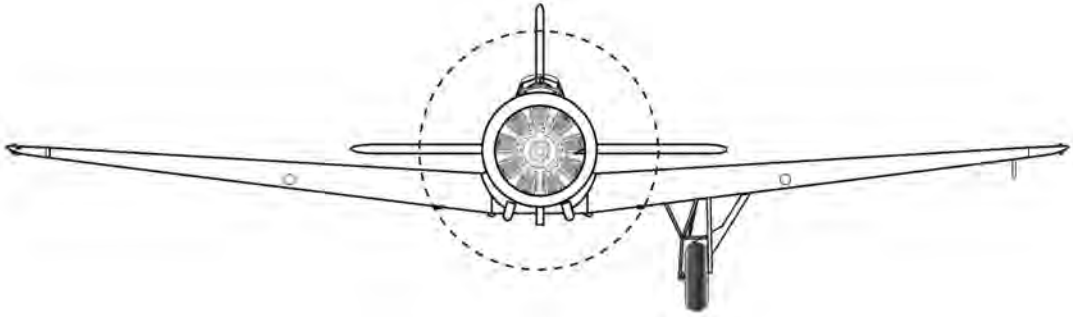
Performance: Max. speed 207-mph, cruise 175-mph; ceiling 23,800 ft.; range 580 mi.

Weights: 3,235 lbs. empty, 4,895 lbs. loaded.

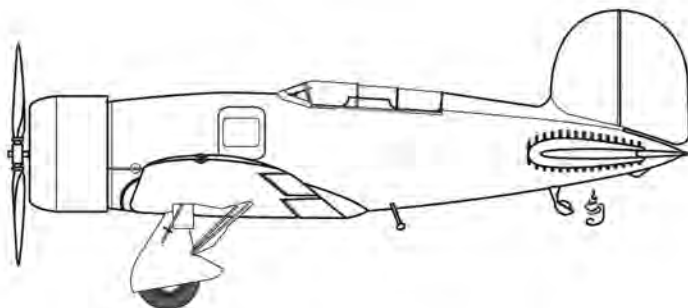
Dimensions: Span 42 ft. 9 in., length 28 ft. 4 in., wing area 293 sq. ft.

Designed by Gerard Vultee as a retractable gear development of the Lockheed model 8 Sirius of 1928, the Lockheed model 8D Altair appeared as one of the most aerodynamically clean aircraft in the world when it flew in 1930. The Army purchased one model 8DL-2 in late 1931 under the designation Y1C-23, which differed from a standard 8D in having an all-metal, semi-monocoque fuselage rather than molded plywood. Following flight trials at Wright Field, Ohio, the aircraft was assigned to Bolling Field, Washington, D.C., as a fast staff transport for use of senior Air Corps and War Department officials. Over the course of its career, the Y1C-23 was fitted with a variable-pitch propeller and repaired after several wheels-up landings. In 1939 the plane was grounded and sent to the technical school at Chanute Field, Illinois, as a static trainer.

A second 8B (a stock, all-wood version), actually the first example tested, had been loaned to the Air Corps in mid-1931 but was purchased after the Y1C-23 and thus placed on the inventory as the Y1C-25. It was used as a fast transport until June 1932, when it was damaged beyond



**Lockheed Y1C-23**





Identical to the Y1C-23, the XRO-1 pictured was used by the assistant secretary of the Navy as a VIP transport.



Seen in military markings in 1943 or 1944, a single Lockheed Orion 9D was impressed into AAF service as the UC-85.

repair in a landing accident. One civil Orion 9D, essentially an Altair airframe with a forward located cockpit, was impressed into AAF service in 1942 as the UC-85.

*Naval Variants:* One Altair 8DL-2 (metal fuselage) was acquired by the Navy in October 1931 under the designation XRO-1 to be used as a personal transport for the Assistant Secretary of the Navy (David Ingalls). It remained based at NAS Anacostia, Maryland, during its term of service.



## American (Fairchild) C-24 —1932

Technical Specifications (Y1C-24)

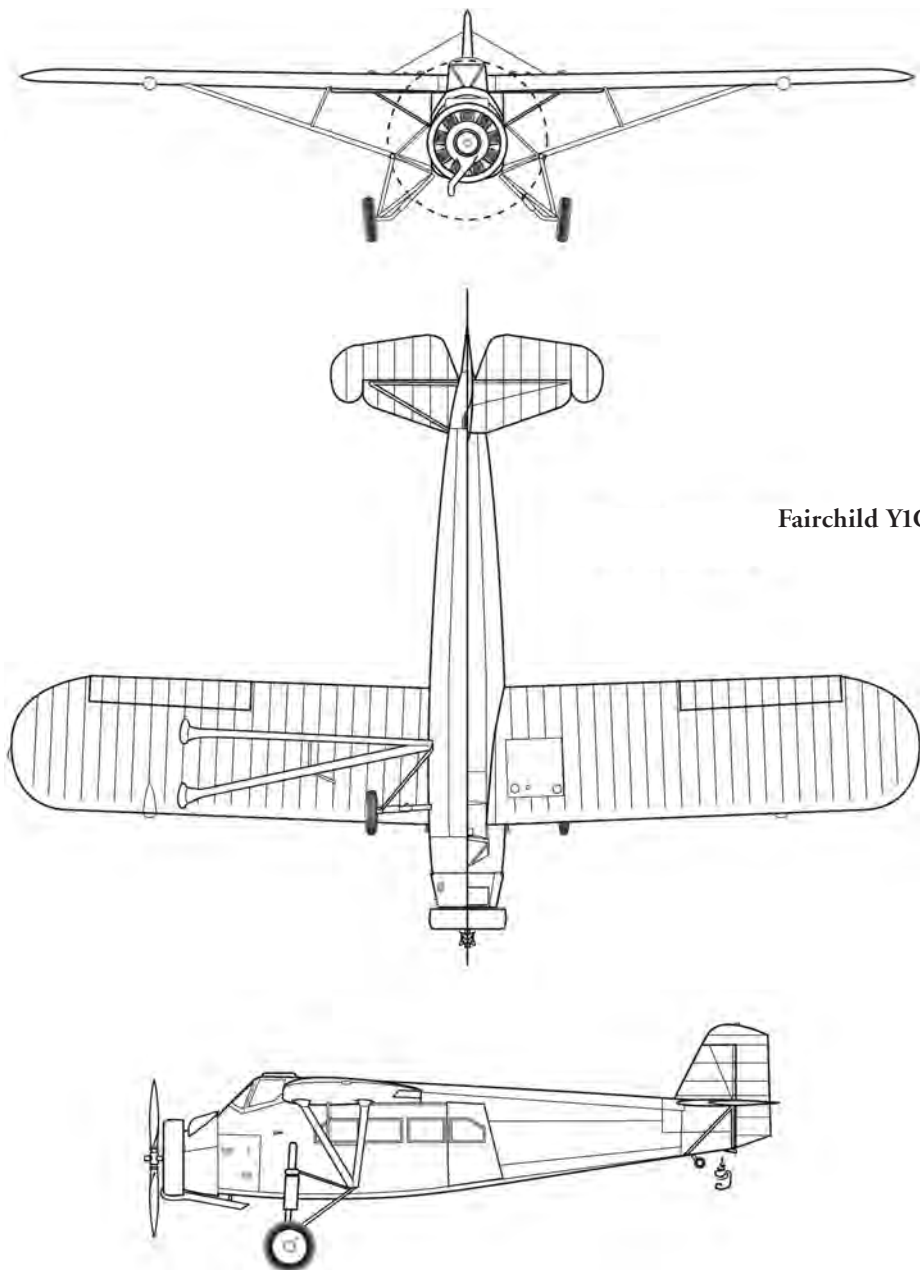
Type: Aeromedical and cargo transport.

Manufacturer: American Airplane & Engine Co. (formerly Fairchild), Farmingdale, New York.

Total military versions: 4 (USAAC).

Capacity: One pilot plus nine passengers or 2,150 lbs. of cargo.

Powerplant: One 575-hp Wright R-1820-1 *Cyclone* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.



Fairchild Y1C-24



**One of the four Fairchild 100 Pilgrims that entered Air Corps service as the Y1C-24 in 1932. They were ultimately adapted as air ambulances.**

Performance: Max. speed 135-mph, cruise 118-mph; ceiling 13,600 ft.; range 510 mi.

Weights: 4,195 lbs. empty, 7,070 lbs. loaded.

Dimensions: Span 57 ft., length 39 ft. 2 in., wing area 459 sq. ft.

The *Wasp*-powered Fairchild model 100 “Pilgrim,” designed by Virginius Clark as a 25 percent scale-up of the FC-2 (C-8), made its first flight in late 1930. Following an upgrade in 1931 to a *Cyclone* engine as the model 100B, 16 examples were sold to American Airways. In 1932, after Fairchild had been reorganized as American Airplane & Engine Co., the Army bought four 100Bs that entered service as the Y1C-24. Like the C-8, the Y1C-24 exhibited excellent short-field characteristics, and with this capability, all four were soon adapted as air ambulances with four medical litters and assigned to support various Air Corps training fields. They remained in service until replaced by newer aircraft during the late 1930s.

## Bellanca C-27 —1933

Technical Specifications (C-27A)

Type: Passenger and cargo transport.

Manufacturer: Bellanca Aircraft Corp., New Castle, Delaware.

Total military versions: 14 (USAAC).

Capacity: Crew of two plus 13 passengers or 4,000 lbs. of cargo.

Powerplant: One 650-hp Pratt & Whitney R-1860-19 *Hornet* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard fixed-pitch metal propeller.

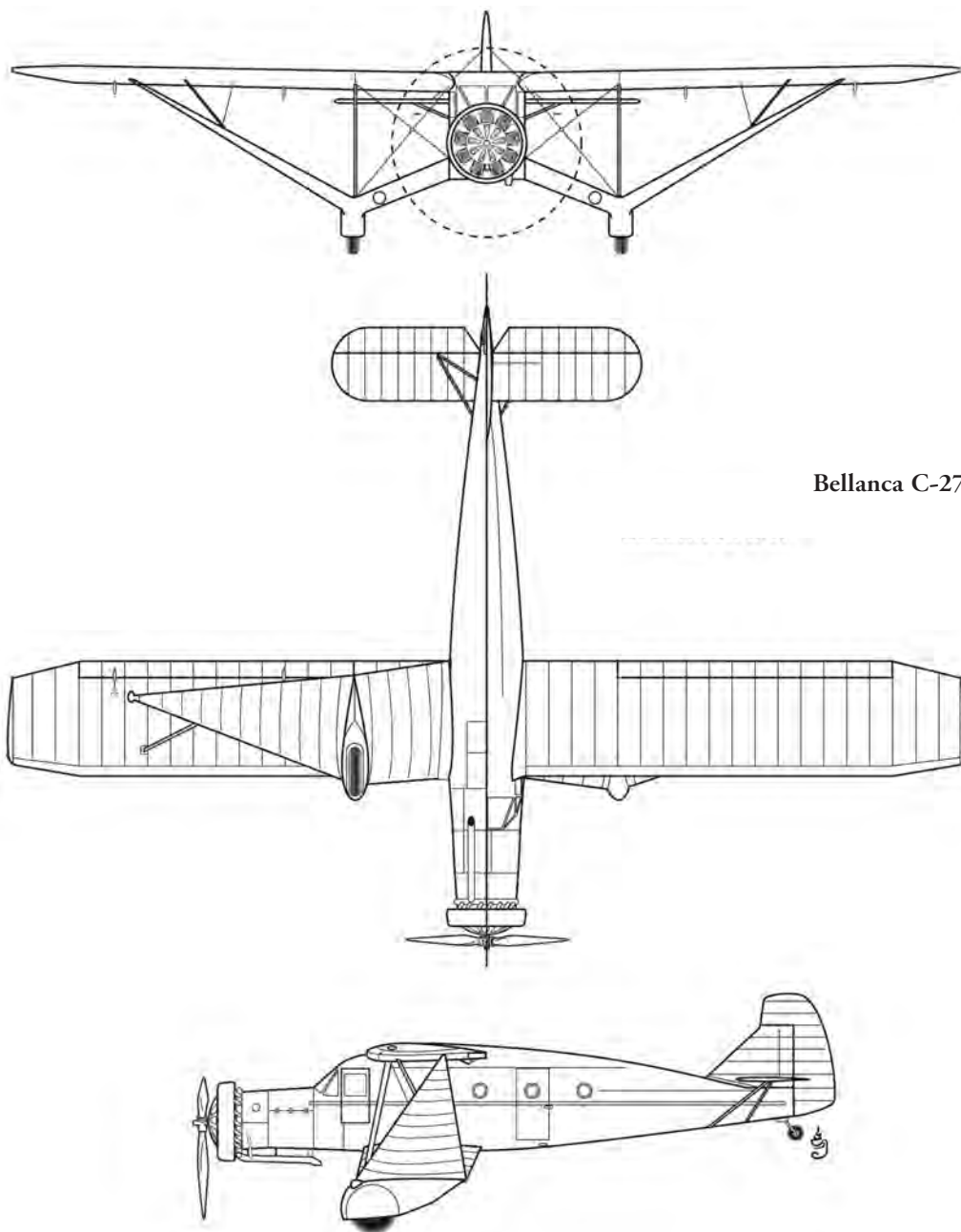
Performance: Max. speed 145-mph, cruise 125-mph; ceiling 15,000 ft.; range 500 mi.

Weights: 5,748 lbs. empty, 9,467 lbs. loaded.

Dimensions: Span 65 ft., length 42 ft. 9 in., wing area 480 sq. ft.

The Bellanca “Airbus” series of commercial aircraft originated with the Curtiss *Conqueror*-powered P-100 in 1930 and entered production as the Wright *Cyclone*-powered P-200 in 1931. The design of the Airbus was characterized by a long nose to which the engine was mounted, a boxy fuselage cross-section, and inverted gull sub-wings which not only added to lift but func-

tioned as landing gear and wing struts. Four P-200s fitted with 550-hp Pratt & Whitney *Hornet* engines were purchased by the Army in 1933 and placed in operation as the Y1C-27. They were followed in Air Corps service by delivery of 10 S-300s with uprated *Hornet* engines under the designation C-27A. One of the C-27As became the C-27B when fitted with a 675-hp Wright R-1820-17 *Cyclone* engine. In another series of modifications the same year, the four Y1C-27s and nine C-27As were all re-designated C-27C after installation of 750-hp Wright R-1820-25 engines. The 14 C-27s remained active until the late 1930s.



Bellanca C-27



The Y1C-27A pictured was one of 20 that entered service in 1933 and 1934. After being refitted with *Cyclone* engines, they all became the C-27C.

### Sikorsky C-28 — 1932

Technical Specifications (Y1C-28)

Type: Amphibious staff and cargo transport.

Manufacturer: Sikorsky Aviation Div., United Aircraft Corp., Bridgeport, Connecticut.

Total military versions: 1 (USAAC).



The sole Sikorsky S-39 procured by the Air Corps in 1932 as the Y1C-28 spent most of its career as a liaison aircraft at West Point.

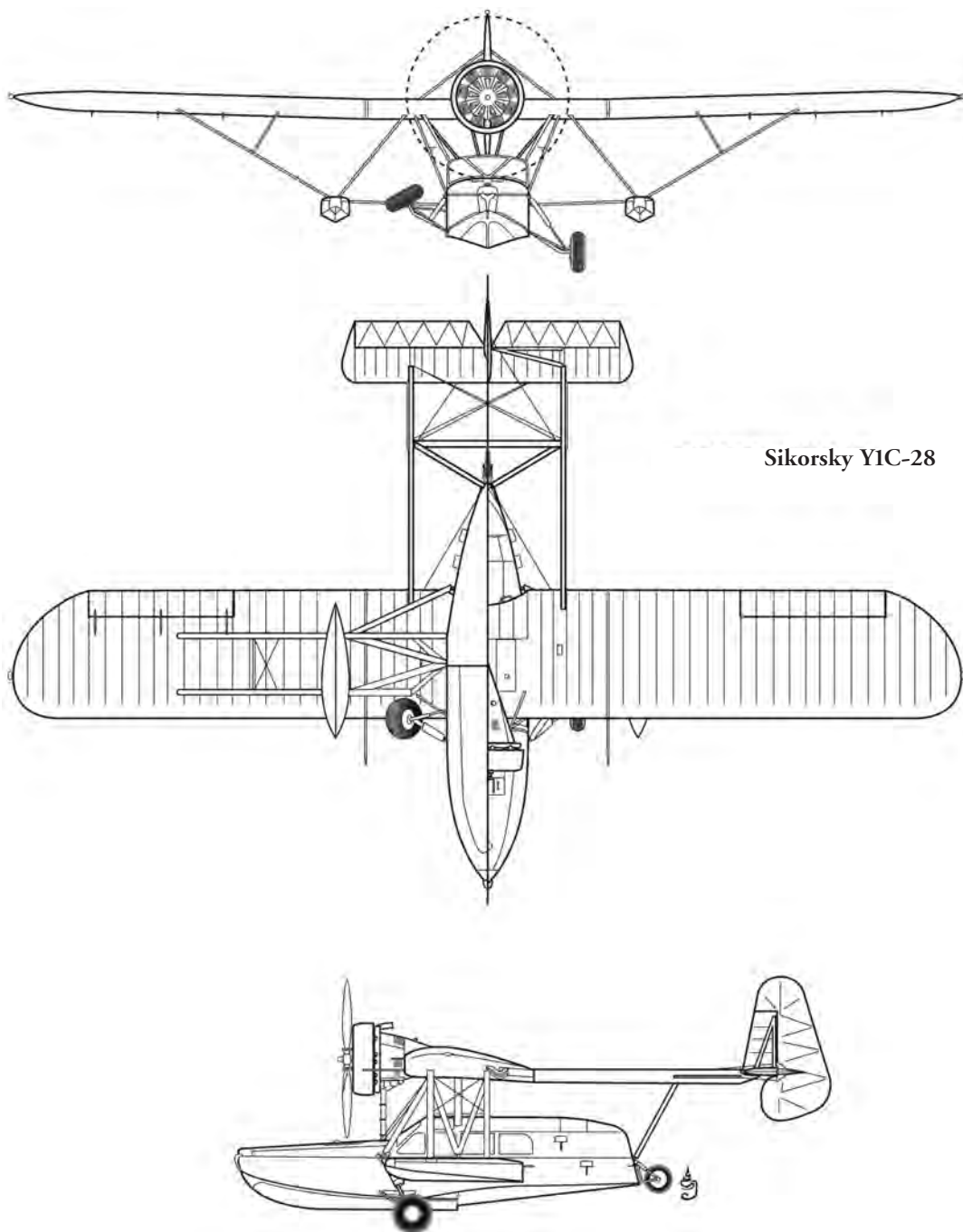
Capacity: Crew of two plus three passengers or 600 lbs. of cargo.

Powerplant: One 300-hp Pratt & Whitney R-985-1 *Wasp Junior* 9-cylinder air-cooled radial engines driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 115-mph, cruise 97-mph; ceiling 18,000 ft.; range 375 mi.

Weights: 2,678 lbs. empty, 4,390 lbs. loaded.

Dimensions: Span 52 ft., length 33 ft. 2 in., wing area 320 sq. ft.



Sikorsky Y1C-28

The Sikorsky S-39, possessing a smaller but similar design configuration to that of the S-38, flew for the first time in 1929 with two tractor-mounted 115-hp Cirrus inline engines, then as the S-39A, was reintroduced in 1930 with a single *Wasp Junior* engine, followed in 1931 by the S-39B with a larger fin and rudder. The Army purchased one S-39B for evaluation purposes in 1932 under the designation Y1C-28. Air Corps trials held at Wright Field, Ohio, revealed that the arrangement of wing and engine struts severely restricted visibility and performance was too limited for the transport role. In the mid-1930s, the Y1C-28 was assigned as a liaison aircraft at the U.S. Military Academy in West Point, New York. Several civilian S-39s are known to have been impressed into Civil Air Patrol service during World War II for use in search and rescue missions, though no AAF serial numbers or military designations were apparently applied.

### Curtiss C-30 (R4C)—1933

#### Technical Specifications (YC-30)

Type: Staff, passenger, and cargo transport.

Manufacturer: Curtiss Airplane Div., Curtiss-Wright Corp., St. Louis, Missouri.

Total military versions: 4 (2 USAAC; 2 USN/USMC).

Capacity: Crew of three plus 15 passengers or 5,565 lbs. of cargo.

Powerplants: Two 650-hp Wright R-1820-23 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 161-mph, cruise 130-mph; ceiling 23,000 ft.; range 716 mi.

Weights: 11,233 lbs. empty, 17,500 lbs. loaded.

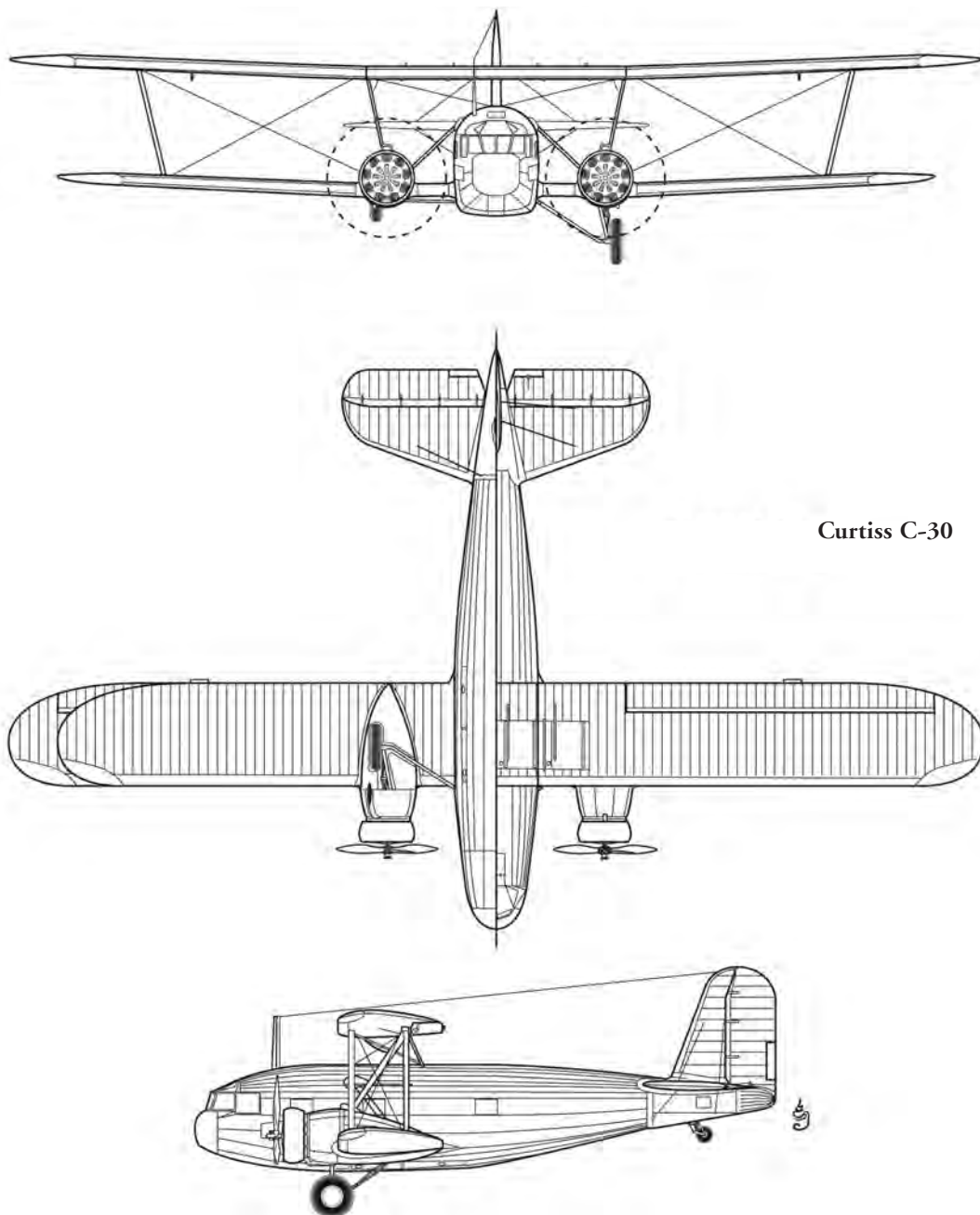
Dimensions: Span 82 ft., length 49 ft. 6 in., wing area 1,208 sq. ft.

Flown for the first time in January 1933, the model T-32 Condor II represented a rapid effort on the part of Curtiss-Wright to offer a large capacity sleeper transport to the airline market before the more advanced Boeing and Douglas designs became available. While retaining an outdated biplane layout with fabric covering, the Condor II nonetheless featured a retractable



One of the two YC-30s acquired by the Air Corps in 1933 as VIP transports. Both were withdrawn in 1938.





Curtiss C-30

landing and powerful *Cyclone* engines giving it better performance than preexisting airliners like the Ford 5-AT. Curtiss ultimately produced 45 Condor IIs in four major variants, including eight BT-32 bombers exported to China and Latin America. In the spring of 1933, at the time initial deliveries were being made to the airlines, the Army purchased two T-32s configured with executive interiors under the designation YC-30 (the “Y” prefix was later deleted). Some sources suggest the Condor IIs were acquired because the Army General Staff still clung to the belief that biplanes were safer than monoplanes. In any case, both C-30s were initially operated as



The first of two R4C-1s ordered for the Marines in 1934. This aircraft was assigned initially to VJ-7M in San Diego. In 1940 both R4C-1s were equipped with skis and transferred to the U.S. Antarctic Expedition.

VIP transports, but were soon relegated to regular staff duties until being withdrawn from active service in 1938.

*Naval Variants:* The Navy procured two late-production Curtiss AT-32Es in 1934 under the naval designation R4C-1. The AT-32E differed from earlier Condor IIs in having uprated R-1820-F engines, full-chord NACA cowlings, and variable-pitch propellers, which upped cruise speed to 155-mph. The first R4C-1, delivered in June, was assigned to Marine squadron VJ-6M in Quantico, Virginia; the second, arriving in November, went to VJ-7M in San Diego, California. After leaving Marine service in 1940, the two aircraft were equipped with skis and attached to the U.S. Antarctic Expedition, and reportedly left behind when the expedition returned in 1941.

## Kreider-Reisner (Fairchild) C-31—1934

Technical Specifications (XC-31)

Type: Passenger and cargo transport.

Manufacturer: Kreider-Reisner Div., Fairchild Corp., Hagerstown, Maryland.

Total military versions: 2 (USAAC).

Capacity: One pilot plus 15 passengers or 3,500 lbs. of cargo.

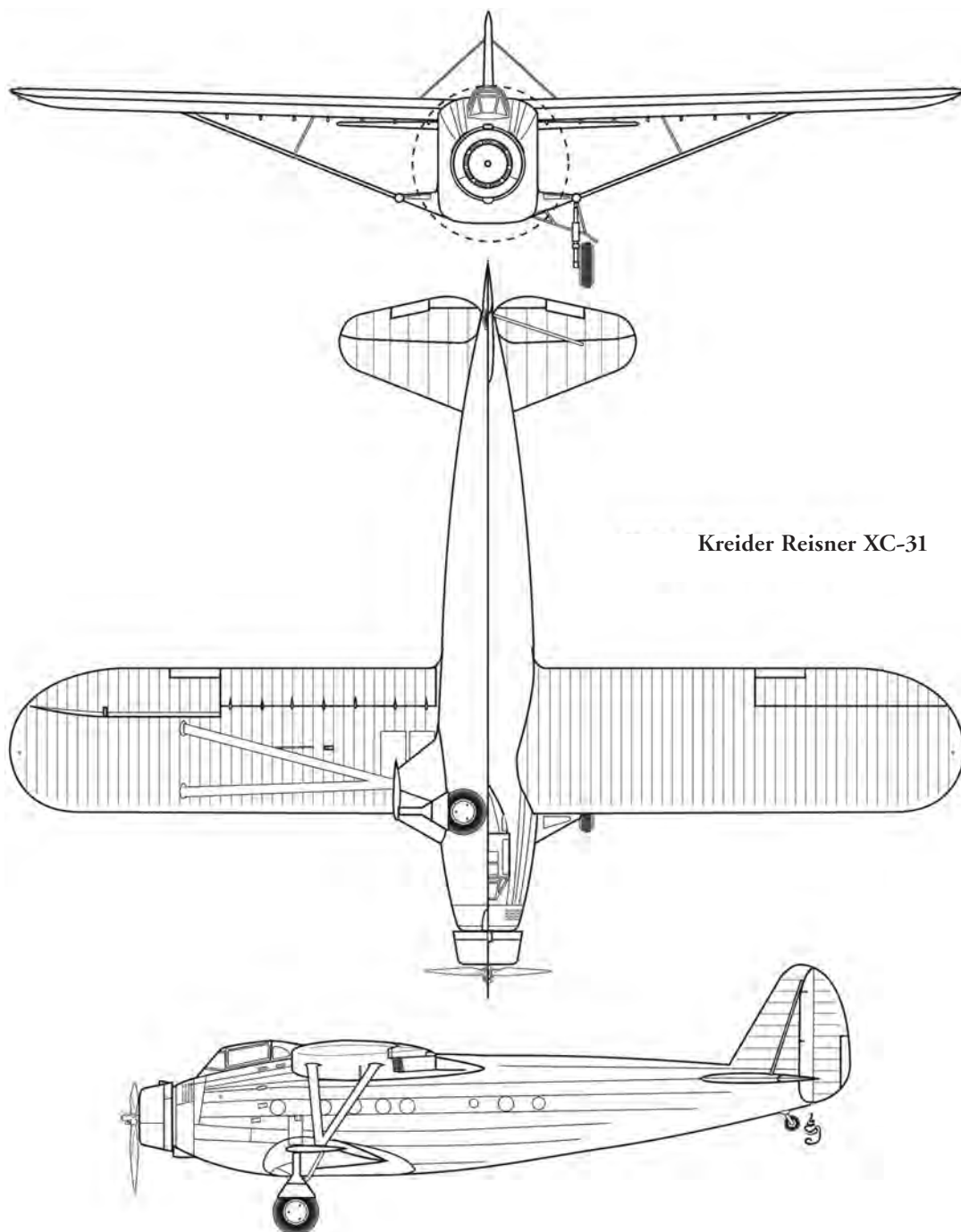
Powerplant: One 750-hp Wright R-1820-25 *Cyclone* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 154-mph, cruise 136-mph; ceiling 15,000 ft.; range 775 mi.

Weights: 7,400 lbs. empty, 12,750 lbs. loaded.

Dimensions: Span 75 ft., length 55 ft. 5 in., wing area 1,208 sq. ft.

Two Kreider-Reisner XC-31s purchased by the Army in 1934 were used to evaluate the viability of using a less-expensive single-engine transport having load-carrying capabilities close to that of twin-engine types, albeit at some reduction in performance. While retaining a compar-

**Kreider Reisner XC-31**

atively outdated structure of fabric covering over a metal framework, the XC-31s did feature such innovations as retractable landing gear mounted on wing-type belly fairings and double cargo doors oriented parallel to the ground for easier loading. The cabin was designed to accommodate either 15 passengers or 3,500 lbs. of cargo. The Air Corps ultimately rejected the idea in favor of procuring more modern twin-engine transports derived from the Douglas DC-2



The Air Corps purchased two XC-31s in 1931. Photograph shows angled cargo door to good advantage.

(C-32 and -33). Once the test program ended, the XC-31s were used for general transportation and cargo duties until withdrawn in the late 1930s.

### Douglas C-32, C-33, C-34, and C-38 (R2D)—1934

#### Technical Specifications (C-33)

Type: Passenger, troop, and cargo transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 50 (45 USAAC/AAF; 5 USN/USMC).

Capacity: Crew of two plus 12 passenger or 2,400 lbs. of cargo.

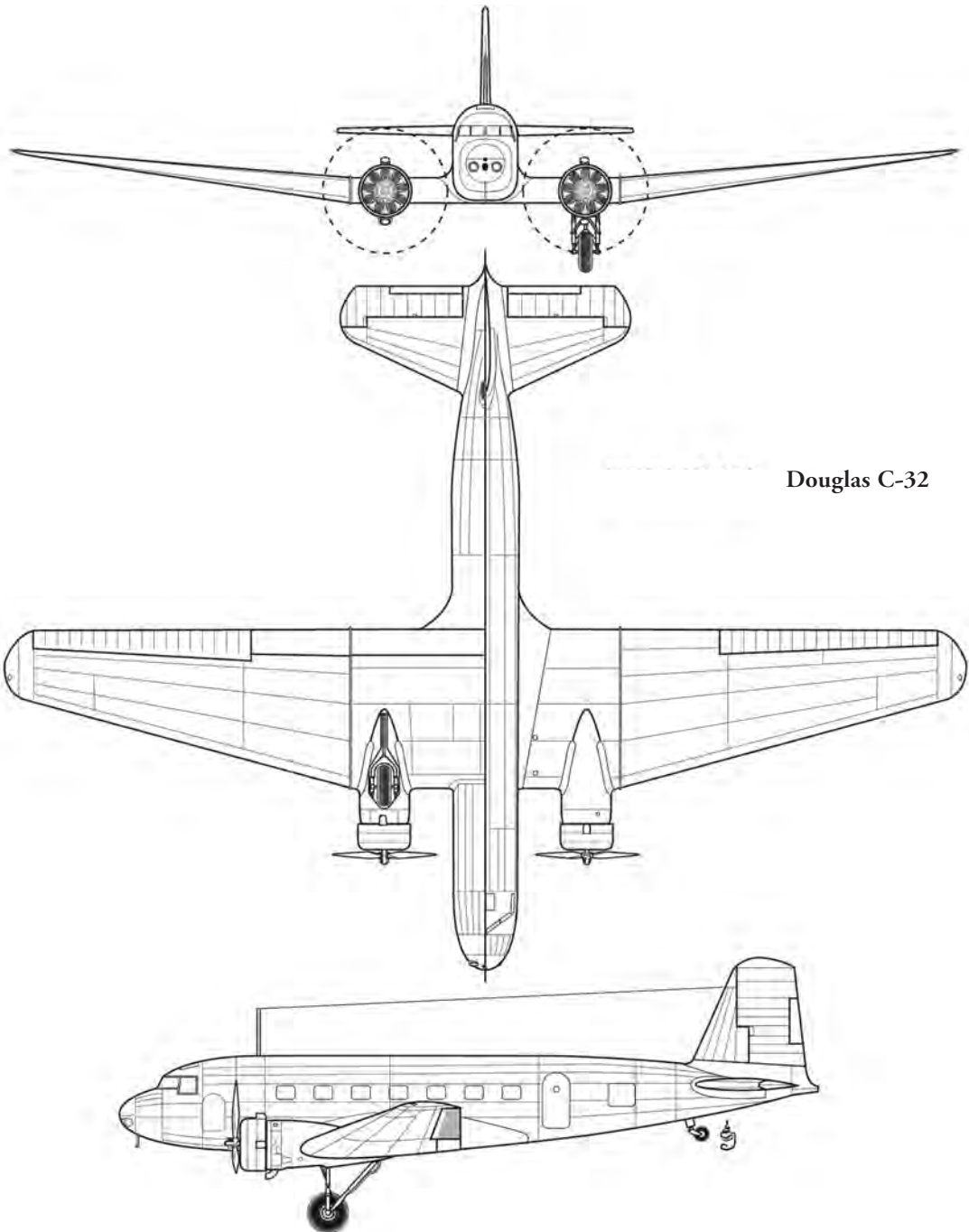
Powerplants: Two 750-hp Wright R-1820-25 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard variable-pitch metal propellers.

Performance: Max. speed 202-mph, cruise 171-mph; ceiling 22,450 ft.; range 915 mi.

Weights: 12,408 lbs. empty, 18,590 lbs. loaded.

Dimensions: Span 85 ft., length 61 ft. 6 in., wing area 939 sq. ft.

The DC-1 (Douglas-Commercial-One), flown for the first time in July 1933 and followed in early 1934 by the definitive DC-2 production model, shifted the paradigm in air travel by offering commercial operators a combination of speed, payload, and range that would enable them — for the first time — to carry passengers at a profit without reliance on air mail contract subsidies. In response to a requirement issued by Transcontinental and Western Airlines (TWA) for an aircraft that could effectively compete against Boeing's Model 247, the Douglas engineering team led by Arthur Raymond evolved a highly advanced low-wing monoplane design that utilized a multi-cellular wing construction and allowed the main spars to run below the floorboard. Other innovations included a twin-strut, knee-action main landing gear retraction system, split flaps that lowered takeoff and landing speeds, and an all-aluminum alloy structure throughout



Douglas C-32

except for fabric-covered control surfaces. More importantly, compared to the Model 247, the DC-2 cruised 14-mph faster and 500 miles further, with four more passengers.

Following the Air Corps' ill-fated efforts in carrying the mail from February to June 1934 (i.e., 66 accidents and 12 fatalities), an investigative body known as the Baker Board recommended that Air Corps officials should consider purchasing the most up-to-date civilian transports



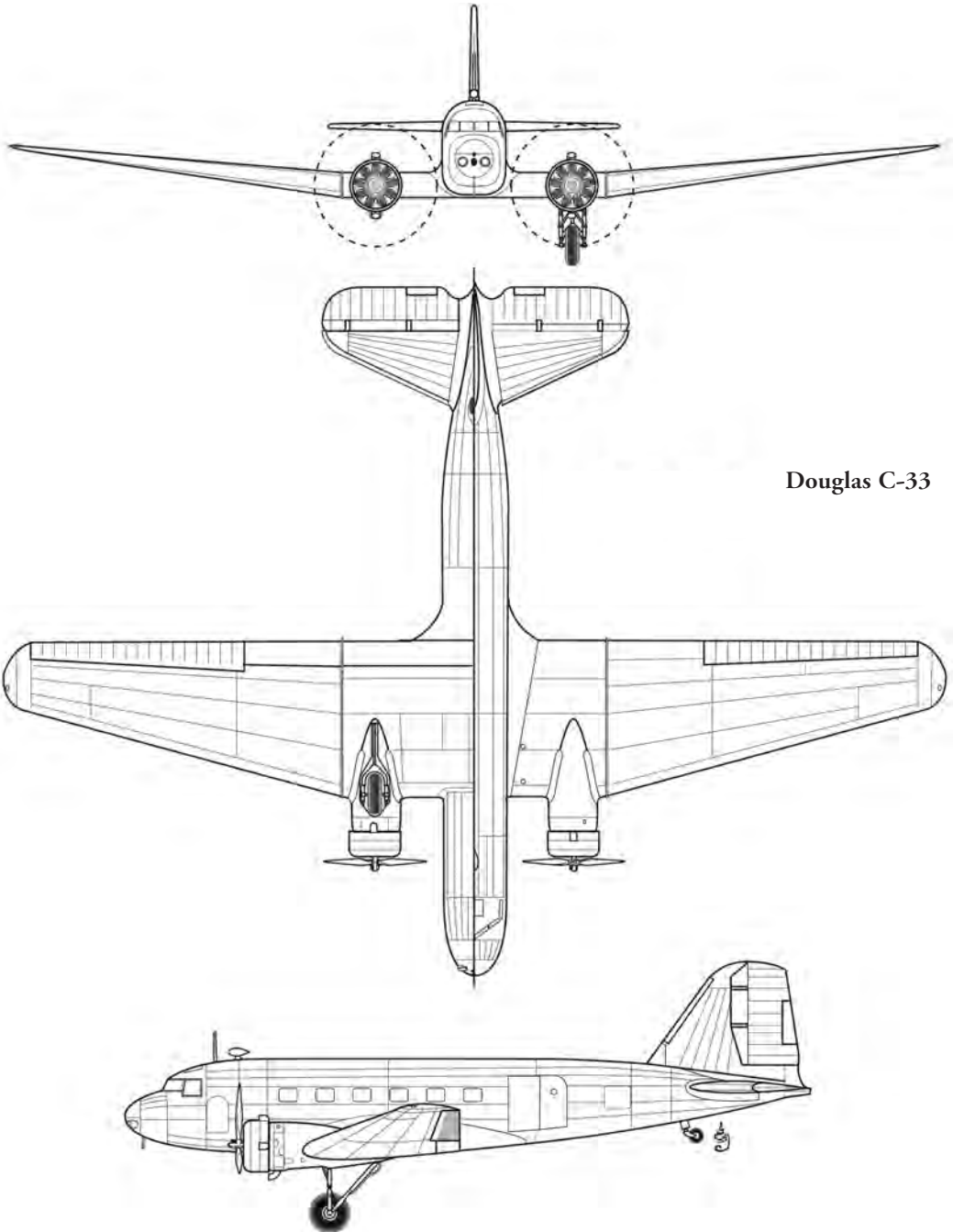
**Following the Air Mail Scandal in 1934, the XC-32 (a militarized DC-2) was evaluated by the Air Corps on the recommendation of the Baker Board.**

instead of aircraft designed to military specifications. In response to this, the Army procured a Douglas DC-2 under the designation XC-32 and commenced evaluations at Wright Field in mid-1935. The only change made to the aircraft's 14-passenger airline configuration was installation of military radios. Once the XC-32 completed trials the following year, Douglas received a production order for 18 aircraft to be built to certain military requirements under the designation C-33. The revised specification omitted the airline interior and called for a reinforced cargo floor, a two-piece cargo door in place of the airline type, interior mounts for a cargo hoist, and a larger DC-3-type fin and rudder to improve directional control. In 1936, while delivery of the C-33s was still in progress, the Air Corps purchased two stock DC-2s with executive interiors which entered service as YC-34s. Out of an effort to improve useful load, the first C-33 was flown to the Douglas factory to be refitted with a DC-3-type rear fuselage and 930-hp R-1820-45 engines, then returned to service in 1937 as the XC-38. Successful trials with the XC-38 led to a 1938 order for 35 production aircraft as the C-39, reported separately below.

After completion of testing, the XC-32 was utilized as a General Headquarters Air Force staff transport until irreparably damaged in a landing accident in 1942. The 17 C-33s formed the bulk of the Air Corps' airlift capability through the late 1930s and continued in USAAF service through most of World War II. Both YC-34s were based at Bolling Field Washington, D.C., as VIP transports for Air Corps staff and the Secretary of War until being assigned to general transportation duties in 1942. The sole C-38 became a staff transport after testing and continued in that capacity with the USAAF until being withdrawn in early 1945. During 1942, 24 airline DC-2s were impressed into USAAF service as the C-32A and remained operational throughout World War II.

*Naval Variants:* In a move to replace its obsolescent Ford RRs with more up-to-date equipment, BuAer ordered five DC-2s from Douglas in 1934 under the naval designation R2D-1. The first three (DC-2-125s) were accepted in late 1934, two being assigned to NAS Anacostia as staff





Douglas C-33

transports and the other to MCAS Quantico with Marine squadron VJ-6M. Two improved DC-2-142s (increased fin area and small interior variations) were delivered in 1935, one entering service with VJ-5 at NAS San Diego and the second with VJ-6M (became VMJ-2 in 1937). The USMC R2D-1s were later used to conduct the first Marine paratrooper experiments. By the time the U.S. entered World War II, a single R2D-1 remained operational with the Marines at Quantico.



One of three DC-2-125s accepted during late 1934, this R2D-1 was assigned to VJ-6M at MCAS Quantico to be used as a staff transport. Of the five R2D-1s ultimately procured, three were allocated to the Marines.

### Lockheed C-35, C/UC-36, and C/UC-37 (R2O/R3O)—1937

Technical Specifications (Y1C-36)

Type: Passenger and cargo transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions: 34 (32 USAAC/AAF; 2 USN/USCG).

Capacity: Crew of two plus eight passengers or 3,545 lbs. of cargo.

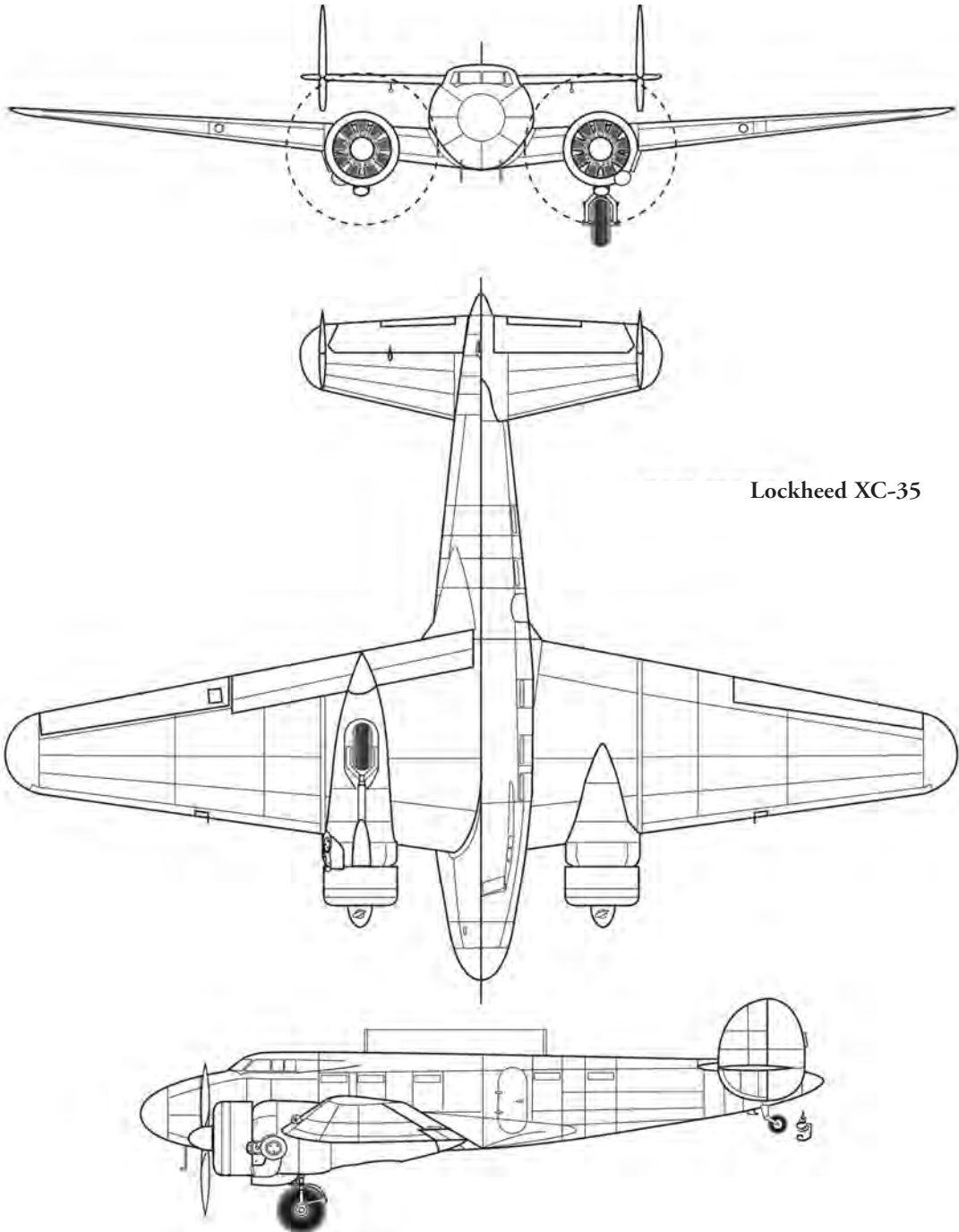
Powerplants: Two 400-hp Pratt & Whitney R-985-13 *Wasp Junior* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard variable-pitch metal propellers.

Performance: Max. speed 202-mph, cruise 190-mph; ceiling 19,400 ft.; range 713 mi.

Weights: 6,454 lbs. empty, 10,500 lbs. loaded.

Dimensions: Span 55 ft. 0 in., length 38 ft. 7 in., wing area 458 sq. ft.

The Model 10 “Electra,” designed by Hall Hibbard and flown for the first time in early 1934, was Lockheed’s first all-metal aircraft and came into national attention in July 1937 when the highly modified Model 10-E piloted by aviatrix Amelia Earhart disappeared during an attempted around-the-world flight. Arriving on the commercial market as one of the most advanced aerodynamic concepts of its day, the Electra was designed to operate on lower capacity airline routes alongside the Boeing 247 and Douglas DC-2. In mid-1936, the Army awarded Lockheed a contract to build a highly modified Model 10-A which was to be used as a flying testbed for high-altitude research. The resulting XC-35 featured a nearly circular fuselage cross-section containing a pressurized crew compartment in the forward section plus turbo-supercharged Pratt & Whitney R-1340-43 engines that would permit it to operate above 30,000 feet. When the XC-35 arrived at Wright Field in May 1937, it was the first aircraft in the world to possess cabin pressurization and subsequently received the Collier Trophy as the most significant aviation achievement of the year. The data gained during the XC-35’s test program gave the Air Corps and the aviation industry valuable experience in the particular problems of high-altitude flight. The aircraft was later donated to the Smithsonian Institution.



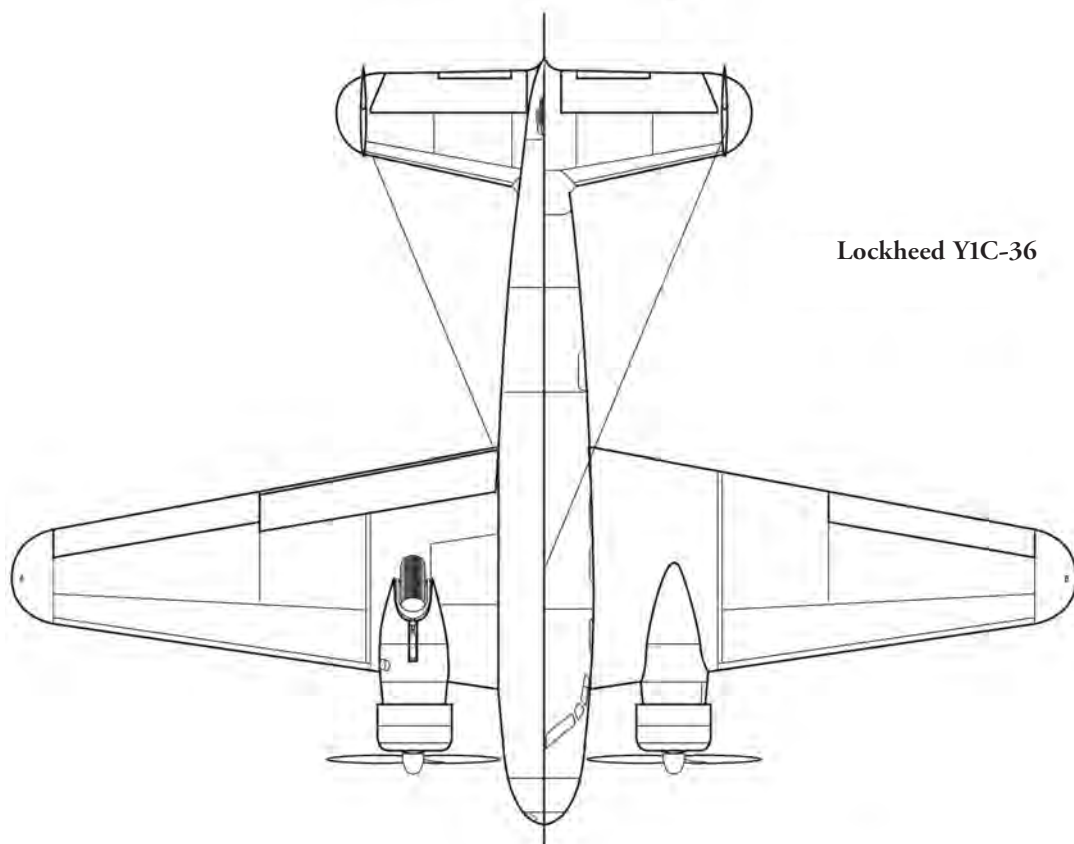
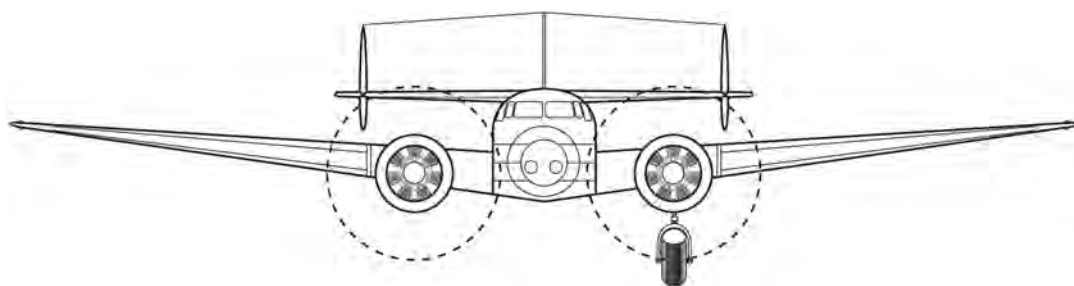
The Air Corps also received three factory-stock Model 10-As in 1937 which initially entered operational service as senior staff transports under the designation Y1C-36. A fourth Model 10-A was acquired in 1938 under the designation Y1C-37 to be used by the National Guard Bureau as a VIP transport. In wartime service, after being assigned to other duties, these aircraft received utility transport designations as the UC-36 and UC-37, respectively. A further 27 civil Model



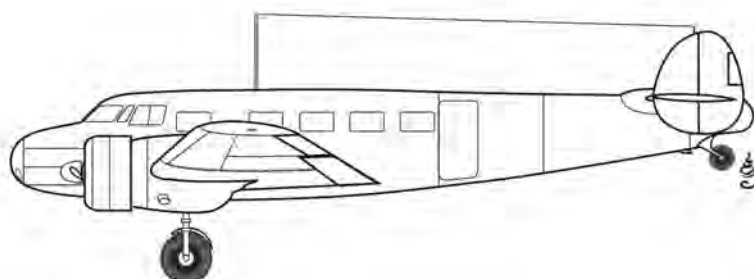
The XC-35, shown here at Wright Field in 1937, was a highly modified Electra 10-A that became the first aircraft to test cabin pressurization.



Lockheed Model 10-A Electra acquired in February 1936 as the XR2O-1. After being painted in a command scheme, the aircraft was assigned to NAS Anacostia for the use of the secretary of the Navy and his staff.



**Lockheed Y1C-36**





10s were impressed into the USAAF during 1942: 15 Model 10-As as the UC-36A, five Model 10-Es (550-hp P&W R-985-S3H1 engines) as the UC-36B, and seven Model 10-Bs (440-hp Wright R-975-E3 engines) as the UC-36C. The USAAF returned the impressed aircraft to their respective owners in 1944, and the UC-36s were sold to the Brazilian Air Force after the war ended.

*Naval Variants:* The Navy procured one Model 10-A in 1936 under the naval designation XR2O-1, assigning it to NAS Anacostia for use by the Secretary of the Navy and his staff. Later the same year, a Model 10-B was added to the Coast Guard inventory as the XR3O-1, to be used as a personal transport for the Secretary of the Treasury; later the aircraft was assigned to general transportation duties at CGAS Biloxi, Mississippi. After wartime service, both were sold surplus.

## Douglas C-39, C-41, and C-42 —1938

### Technical Specifications (C-39)

Type: Passenger, troop, and cargo transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 35 (USAAC/AAF).

Capacity: Crew of three plus 12 passengers or 3,600 lbs. of cargo.

Powerplants: Two 975-hp Wright R-1820-55 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 210-mph, cruise 156-mph; ceiling 20,600 ft.; range 1,170 mi.

Weights: 14,287 lbs. empty, 21,000 lbs. loaded.

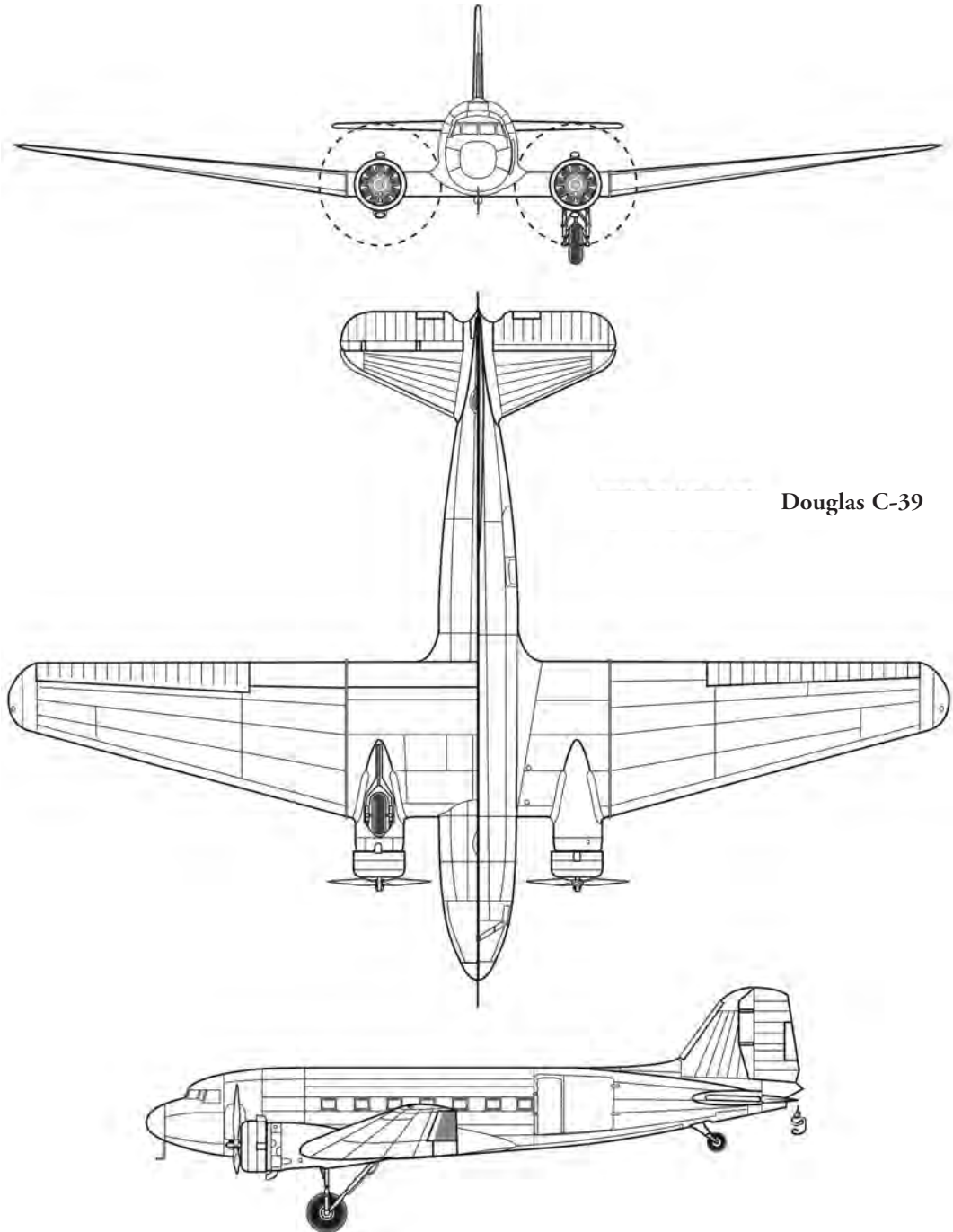
Dimensions: Span 85 ft., length 61 ft. 6 in., wing area 939 sq. ft.

After successful testing of the C-38 (see above), the Army awarded Douglas a contract in early 1938 for 35 aircraft as the C-39. Unofficially known as the DC-2½, the C-39 represented



The C-39, pictured in 1938, was a hybrid that combined components of the DC-2 and DC-3, plus landing gear from the B-18 bomber. They served continuously until being sold to foreign governments in 1944.



**Douglas C-39**

a hybrid of different assemblies: DC-2 outers wing panels, nose, and main fuselage; DC-3 wing center-section, aft fuselage, and tail group; and B-18 landing gear. Like the C-33, the C-39 came with a reinforced floor, double cargo door, and cargo hoist attachment points in the interior. The improvements combined to boost useful load to 3,600 lbs., a 1,200 lb. increase over the C-33. During the production run, one C-39 became the sole C-41 when fitted with

1,200-hp Pratt & Whitney R-1830-21 engines and an airline door; another C-39 became the C-42 when completed with 1,000-hp Wright R-1820-53 engines, an airline door, and an executive interior.

As they entered service from late 1938 on, the 33 C-39s were distributed among various Air Corps bases to augment the airlift capacity of existing C-33s, but after 1940 were combined into the 10th Air Transport Group at Patterson Field, Ohio. In 1941 several C-39s assigned to Clark Field in the Philippines were subsequently used to evacuate personnel to Australia when the Japanese attacked. During World War II, the C-39s served primarily in the China-Burma-India and Southwest Pacific Theaters until being sold to foreign governments in 1944. One example is preserved at the USAF Museum in Dayton, Ohio. Upon delivery in 1939, the C-41 became the personal transport of Air Corps Chief, Gen. H. H. Arnold, then later, during the wartime era, was reassigned to senior Pentagon staff in Washington. The C-42 initially operated with GHQ Air force at Bolling Field, Washington, D.C., but later served at several different USAAF bases until being sold surplus after the war.

### Lockheed C/UC-40 (JO/R3O-2)—1938

Technical Specifications (C-40A)

Type: Passenger and cargo transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions: 32 (24 USAAC/AAF; 7 USN/USMC).

Capacity: Crew of two plus six passengers or 2,690 lbs. of cargo.

Powerplants: Two 400-hp Pratt & Whitney R-985-48 *Wasp Junior* 9-cylinder air-cooled radial engines driving two-bladed variable-pitch metal propellers.

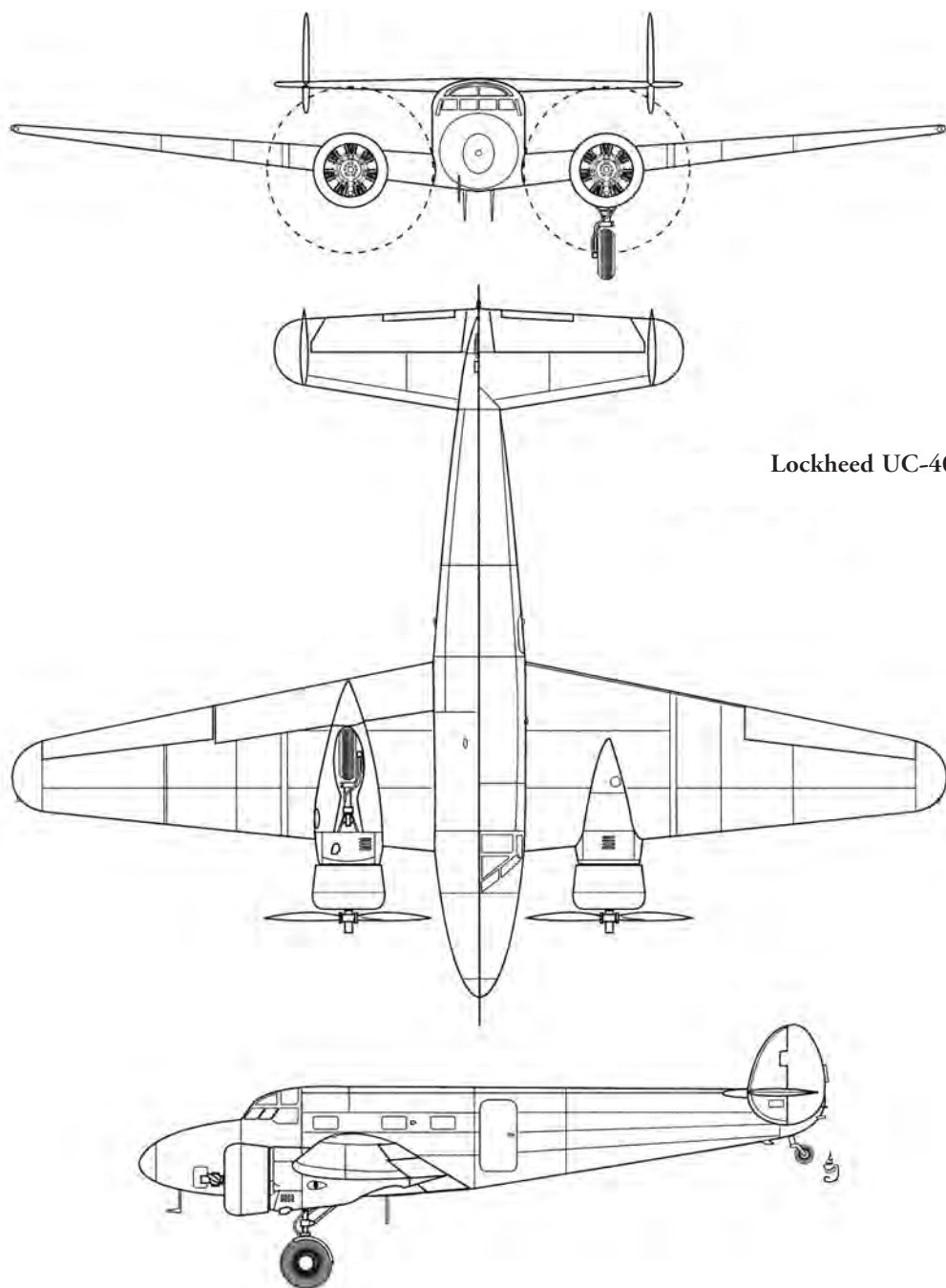
Performance: Max. speed 218-mph, cruise 208-mph; ceiling 22,900 ft.; range 800 mi.

Weights: 5,765 lbs. empty, 8,650 lbs. loaded.

Dimensions: Span 49 ft. 6 in., length 36 ft. 4 in., wing area 352 sq. ft.



One of the 10 Lockheed 12-As procured by the Air Corps in 1928 as the C-40A. Redesignated UC-40A in 1943.



Lockheed UC-40

Introduced in mid-1936 as a scaled-down version of the Model 10, the Lockheed Model 12 “Electra Junior” was marketed toward smaller commercial airline carriers who operated on feeder routes. After the Air Corps briefly evaluated one Model 12-A demonstrator in mid-1938, it and two identical examples were purchased under the designation C-40. Ten more 12-As procured in late 1938 and placed on the inventory as C-40As, featured a new interior arrangement allowing them to be converted to passenger or cargo duties. One additional 12-A ordered in



The Navy acquired six Lockheed 12-As in 1937 and 1938, one as the JO-1 (five seats) and five as the JO-2 (six seats). Photograph depicts the first of three JO-2s assigned to the Marines during 1938.

1938 was modified at the factory to incorporate a fixed tricycle landing gear and delivered to Wright Field for testing in mid-1939 as the C-40B, but once the test program ended in 1940, the aircraft was converted back to a conventional, retractable gear configuration and returned to service as a C-40A. The last batch of Model 12-As came in 1942 when the U.S. government impressed 11 civilian examples into the USAAF as the C-40D. In 1943, all 12-As still in service received utility-cargo designations as the UC-40, UC-40A, and UC-40D, respectively (UC-40C not used).

The three C-40s initially served as staff transports while the C-40As were assigned to operational units for support, liaison, and light cargo carrying duties. A number of these aircraft were declared surplus during World War II and sold off to foreign air forces. Five of the C/UC-40Ds were afterward lend-leased to Britain and three were written off in accidents while in USAAF service. One UC-40D served as a staff transport in the Middle East Theater until 1946.

*Naval Variants:* The Navy purchased one Lockheed Model 12-A under the designation JO-1 in mid-1937 for use of the Naval Attaché in Rio de Janeiro, Brazil, then in late 1937, procured five more as the JO-2 staff transports, two of which were assigned to the NAS Anacostia and three to the Marines. The single XJO-3, delivered to NAS Anacostia in October 1938, was an experimental variant fitted with fixed tricycle landing gear and an arrestor hook for landing deck trials aboard the aircraft carrier U.S.S. *Lexington*. Once deck trials were completed, the XJO-1 moved to the Boston airport to serve as an airborne radar testbed in connection with MIT and Bell Laboratories. A civil 12-A was impressed into naval service in mid-1941 as the R3O-2 (the use of this designation rather than JO is an anomaly) and shipped to London, England, for the use of the Naval Attaché. With the exception of the R3O-2 and one Marine JO destroyed during the attack on Pearl Harbor, remaining Navy and Marine examples continued as staff transports at stateside bases for the duration of World War II.

## Explanatory Note on Douglas DC-3 Military Derivatives

The military lineage of the Douglas DC-3 is complex. Between 1939 and 1945, under a combination of production contracts and wartime impressment orders, over 10,000 DC-3s reached American military service under 13 distinct designations that were further categorized into 83 different sub-variants. The following table provides a summary of each:

USAAC, USAAF, USAF, and U.S. Army Variants:

<i>Designation</i>	<i>Quantity</i>	<i>Description</i>
C-41A	1	DC-3A with executive interior, P&W R-1830-21 <i>Twin Wasp</i> engines.
C-47	965	First DC-3As built to military specifications, R-1830-92 engines.
C-47A	5,254	As C-47 with 24V electrical system.
RC-47A	—	C-47As equipped for ECM and flare dropping after 1945; re-designated EC-47A in 1962.
SC-47A	—	C-47As equipped for search and rescue after 1945; re-designated HC-47A in 1962.
VC-47A	—	C-47As reconfigured as staff transports after 1945.
C-47B	3,364	High-altitude version, added fuel capacity, R-1830-90B/C engines with two-stage superchargers.
TC-47B	—	C-47Bs completed as navigation trainers during production.
VC-47B	—	C-47Bs reconfigured as staff transports after 1945.
XC-47C	1	C-47A fitted with amphibious floats.
C-47D	—	C-47Bs with high-altitude superchargers removed after 1945.
AC-47D	—	Side-firing gunship conversions from 1964 to 1966.
EC-47D	—	Airborne early warning conversions in early 1950s.
FC-47D	—	Initial designation of gunship conversion, changed to AC-47D.
NC-47B	—	C-47B modified for electronics testing.
C-47E	8	C-47As and Bs modified to check airways radio beacons, P&W R-2000-4 engines.
YC-47F	—	Originally YC-129 Super DC-3 military prototype.
EC-47N/ P/Q	—	C-47As and Bs modified for electronic warfare (EW) in mid-1960s.
C-48	1	Impressed airline DC-3A, P&W R-1830-82 <i>Twin Wasp</i> engines.
C-48A-C	35	Impressed airline DC-3As or DST-As (sleepers), P&W R-1830-51 or -82 engines.
C-49	6	Impressed airline DC-3s, Wright R-1820-79 <i>Cyclone</i> engines.
C-49A-K	128	Impressed airline DC-3s or DSTs (sleepers), Wright R-1820-71 or -91 engines, some converted to paratrooper seating.
C-50	4	Impressed airline DC-3s, Wright R-1820-85 engines.
C-50A-D	10	Impressed airline DC-3s, Wright R-1820-79 or -81 engines, some converted to paratrooper seating.
C-51	1	Impressed Canadian airline DC-3, Wright R-1820-83 engines.
C-52	1	Impressed airline DC-3A, P&W R-1830-51 engines.
C-52A-D	4	Impressed airline DC-3As similar to C-52.
C-53	193	Troop carrier version of DC-3A, P&W R-1830-92 engines.
XC-53A	1	C-53 tested with full-span slotted flaps.
C-53B	8	Winterized C-53 with navigators station and added fuel capacity.
C-53C	17	C-53 with larger port-side door and side seats.
C-53D	159	C-53C with 24V electrical system.
C-68	2	Impressed airline DC-3As, P&W R-1830-92 engines, similar to C-48.
C-84	4	Impressed airline DC-3s, Wright R-1820-71 engines, similar to C-49.
C-117A/B	16	C-47Bs converted to VIP configuration.
C-117C	1	VC-47A converted to VIP configuration.
C-117D	—	See R4D-8, in Part B, below.
XCG-17	1	C-47 with engines removed, tested as troop glider.

## USN, USMC, and USCG Variants:

<i>Designation</i>	<i>Quantity</i>	<i>Description</i>
R4D-1	100	C-47s allocated from USAAF.
R4D-2	2	Impressed airline DC-3s, Wright R-1820-71 engines.
R4D-3	20	C-53Ds allocated from USAAF.
R4D-4	10	Impressed airline DC-3As, P&W R-1830-51 engines.
R4D-4B	7	Impressed airline DC-3s, Wright R-1820-71 engines.
R4D-4Q	—	R4D-4s converted to electronic countermeasures (ECM).
R4D-5	238	C-47As from allocated from USAAF; re-designated C-47H in 1962.
R4D-5E	—	R4D-5s with specialized electronic equipment.
R4D-5L	—	R4D-5s equipped for Antarctic operations; re-designated LC-47H in 1962.
R4D-5Q	—	R4D-5s converted to ECM; re-designated EC-47H in 1962.
R4D-5S	—	R4D-5s converted as antisubmarine warfare (ASW) trainers; re-designated SC-47H in 1962.
R4D-5T	—	R4D-5s converted as trainers and personnel transports; re-designated TC-47H in 1962.
R4D-5Z	—	R4D-5s configured as VIP transports; re-designated VC-47H in 1962.
R4D-6	157	C-47Bs allocated from USAAF; re-designated C-47J in 1962.
R4D-6L	—	R4D-6s equipped for Antarctic operations; re-designated LC-47J in 1962.
R4D-6Q	—	R4D-6s converted to ECM; re-designated EC-47J in 1962.
R4D-6S	—	R4D-6s converted as ASW trainers; re-designated SC-47J in 1962.
R4D-6T	—	R4D-6s converted as trainers and personnel transports; re-designated TC-47J in 1962.
R4D-6Z	—	R4D-6s configured as VIP transports; re-designated VC-47J in 1962.
R4D-7	44	TC-47Bs allocated from USAAF; re-designated TC-47K in 1962.
R4D-8	100	Super DC-3 conversion of R4D-5s and -6s; re-designated C-117D in 1962.
R4D-8L	—	R4D-8s equipped for Antarctic operations; re-designated LC-117D in 1962.
R4D-8T	—	R4D-8s converted as trainers; re-designated TC-117D in 1962.
R4D-8Z	—	R4D-8s configured as VIP transports; re-designated VC-117D in 1962.

### Douglas C-41A, C-47 through C-53, C-68, C-84, and C-117 (R4D)—1939

#### Technical Specifications (C-47B)

Type: Passenger, troop, and cargo transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 10,263 (7,772 USAAC/AAF/USAF, and U.S. Army; 571 USN/USMC/USCG; 1,920 Lend-Leased).

Capacity: Crew of three plus 28 troops or 6,000 lbs. of cargo.

Powerplants: Two 1,200-hp Pratt & Whitney R-1830-90B/C *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

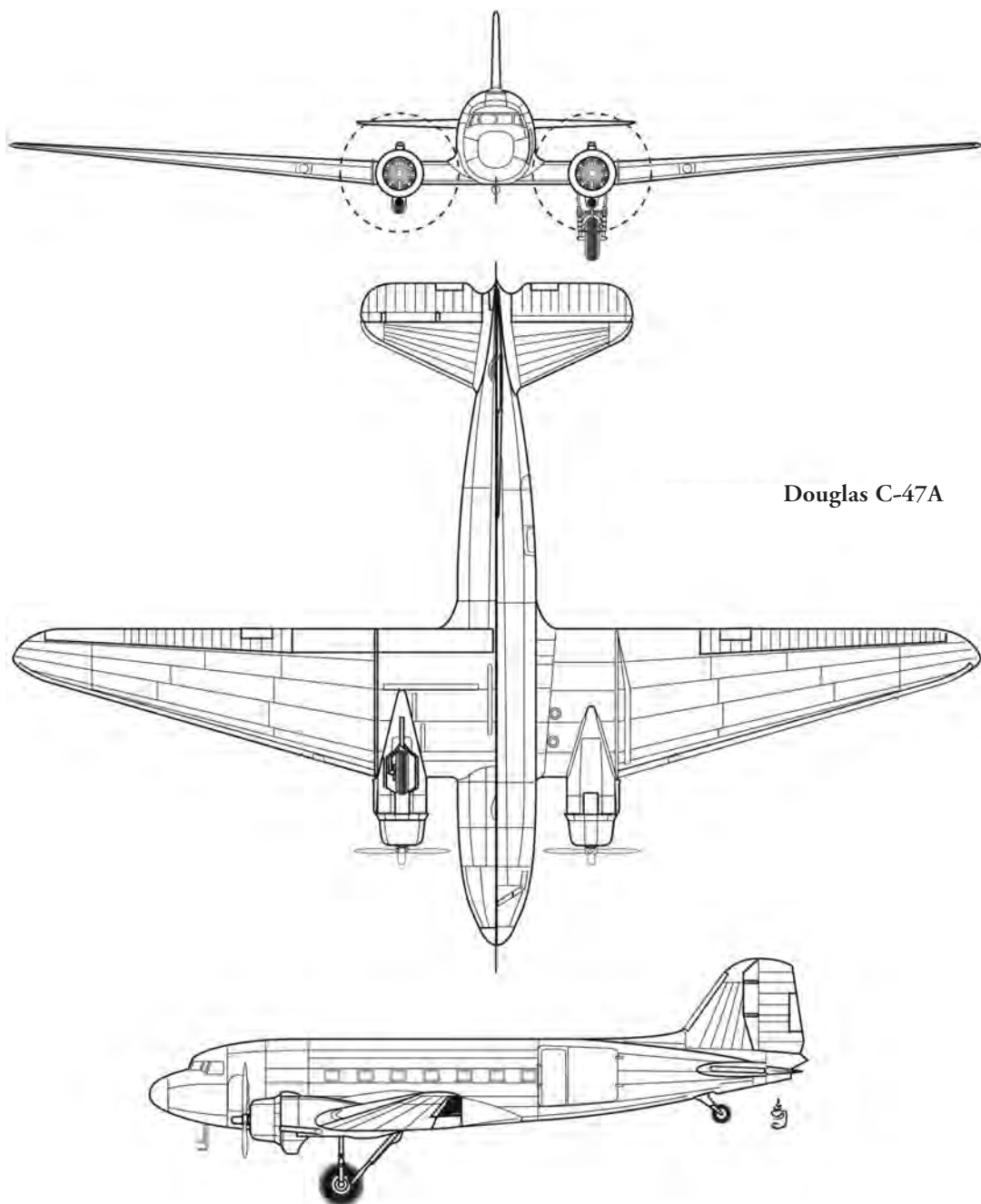
Performance: Max. speed 224-mph, cruise 160-mph; ceiling 26,400 ft.; range 2,125 mi.

Weights: 18,135 lbs. empty, 26,000 lbs. loaded.

Dimensions: Span 95 ft. 6 in., length 63 ft. 9 in., wing area 987 sq. ft.

Flown for the first time in December 1935 as the DST (Douglas Sleeper Transport), the legendary Douglas DC-3 originated in response to an American Airlines requirement for a sleeper transport that would combine the spaciousness of the Curtiss AT-32E Condor biplane





Douglas C-47A

with the performance and economies of the more modern DC-2. The new type was initially offered in two versions: the 14-berth DST (identifiable by small upper berth windows above the main windows) and the 21-seat DC-3 day transport. Either of two engine combinations could be specified: Wright R-1820 *Cyclones* (DST/DC-3) or Pratt & Whitney R-1830 *Twin Wasps* (DST-A/DC-3A). Approximately 400 DC-3/DC-3As and 40 DST/DST-As had been delivered to airline customers by the time the United States entered World War II in December 1941. But



Nearly new AAF C-47B seen in 1943. The C-47B was distinguishable from the A by the presence of full-chord air intakes on the upper cowlings.

even before then, the outbreak of war in Europe in September 1939, coupled with serious concerns over Japan's expansionist policies in the Far East, had prompted the U.S. government to move forward with plans to order new military aircraft in unprecedented quantities. Out of an effort to simplify mass production, the Army and Navy Departments agreed upon standardized versions of aircraft that would be procured for both services. Thus, in September 1940, Douglas received an initial order for 965 DC-3As (R-1830-92 engines) to be built to military specifications under the Army Air Corps designation C-47, 100 of which would be allocated to the Navy as the R4D-1. Though seldom used by military personnel, Douglas later applied the factory name "Skytrain" to all C-47 production models.

The first actual military variant, a DST-A outfitted with an executive interior, was delivered to the Air Corps on September 14, 1939. It received the designation C-41A, even though it was not a derivative of the earlier C-41 hybrid. After assignment to the 1st Staff Squadron at Bolling Field Washington, D.C., the C-41A served as a VIP transport for the Secretary of War, then later still, as a regular staff transport until being sold surplus in late 1945. Deliveries of the first military C-47s to the U.S. Army Air Forces (AAF created June 1941) commenced in October 1941. The C-47 featured left-hand double cargo doors with a standard door built into the front half, a reinforced floor to support up to 6,000 lbs. of cargo, cargo hoist fittings inside the door, and canvas fold-down seats (metal on later versions) for 28 troops. To keep pace with wartime orders, C-47s were produced at plants established in Long Beach, California, and Oklahoma



**Long-serving C-47A in postwar USAF service. Last examples were withdrawn during the mid-1970s.**

City, Oklahoma, as well as Douglas's main facility at Santa Monica. The C-47A, succeeding the C-47 in production during 1942, featured a 24-volt electrical system and became the most numerous variant, with 5,254 examples delivered in 1942 and 1943. The need to operate at higher altitudes, specifically over the Himalayan Mountain Range in the China-Burma-India theater, resulted in the introduction of the C-47B in 1943. The B differed from the A in having R-1830-90B/C engines with two-stage superchargers, plus more powerful cabin heaters to deal with colder temperatures. During production, 133 completed as navigational trainers were delivered as TC-47Bs. A total of 3,364 C/TC-47Bs had been delivered when all C-47 production ended in October 1945.

In 1942 and 1943, while C-47A/B production was in progress, the Douglas plant at Santa Monica also manufactured 380 dedicated troop carrier versions of the DC-3A as the C-53 and C-53A-D, dubbed with the factory name "Skytrooper." The 221 C-53s came with 28 fixed seats and a single, airline type door; the sole XC-53A appeared in 1942 as an experimental prototype with full-span, slotted flaps; eight C-53Bs intended for Arctic service featured winterized equipment and added fuel capacity; 17 C-53Cs introduced a larger port-side door; and the final 159 C-53Ds had side seating similar to C-47s. Production of C-53s ceased in 1943 and reverted to C-47Bs after military officials determined that the type's lack of cargo doors, reinforced floors, and cargo handling equipment limited its usefulness in actual operations. During the course of the war, a couple of C-47s were modified for experimental purposes: a C-47 fitted with a pair of Edo Model 78 amphibious floats was tested in 1943 as the XC-47C but not placed in production; another, with engines removed and faired-over, was tested in 1944 as the XCG-17 troop glider, and while performing very well in this role, came too late to be placed in operation. In 1944 Douglas completed 16 aircraft with VIP interiors as the C-117A, combining C-53 fuselages with the supercharged R-1830-90C engines of the C-47B.

In addition to military production, the U.S. government impressed some 213 civil DST/DC-3s and DST-A/DC-3As into military service in 1942 shortly after the declaration of war.



One of the 53 C-47Ds converted to side-firing gunships during the Vietnam War as the AC-47D, which operated under call-sign “Spooky.”

A little less than half were in-service airliners while the balance were as yet incomplete aircraft on the Douglas production line. In some instances, in-service DC-3s were retained by the parent airline and flown by its pilots, subject however, to military scheduling and orders. As shown in the foregoing Explanatory Note, impressed DC-3s received designations that distinguished them from those built to military specifications. In general, *Twin Wasp*-powered DC-3A/DST-As came into to service as the C-48, C-52, and C-68; and *Cyclone*-powered DC-3/DSTs as the C-49, C-50, C-51, and C-84. The DST-A/DSTs primarily saw use in the aeromedical role, whereas a number of the DC-3A/DC-3s were reconfigured to carry paratroopers. During 1944, after significant numbers of C-47s had reached service, the government began the process of returning ownership and control of impressed aircraft back to the airlines.

Besides those entering service with American armed forces, 1,920 DC-3As produced under AAF serial numbers were Lend-Leased to Great Britain from 1942 to 1945: 53 C-47s as the *Dakota II*; nine C-53s as the *Dakota II*; 962 C-47As as the *Dakota III*; and 896 C-47Bs as the *Dakota IV*. And as they were delivered, a number of *Dakota III*s and *IV*s were subsequently transferred to operational control of Commonwealth Canadian (RCAF) and Australian (RAAF) forces. Moreover, DC-3 production was not limited to the United States. In early 1938, Mitsui & Co. Ltd., an American subsidiary of a Japanese trading firm, purchased 13 DC-3s and nine DC-3As together with a license agreement to build the type in Japan. Ironically, the 485 militarized DC-3 copies manufactured by Nakajima and Showa from 1940 to 1945 as the L2D,

Allied code name “Tabby,” became the Japanese Imperial Navy’s standard wartime transport. Likewise in 1938, the Soviet Union purchased 22 DC-3s along with license-production rights, with the result that approximately 5,000 DC-3 copies were completed in Russia from 1939 to 1954 as the Lisunov Li-2 “Cab.”

During World War II, the AAF was by far the largest user of military DC-3 variants and impressed airliners, accounting for a total of 7,772. They became a critical factor of combat operations in every theater of war, giving Allied forces mobility in moving personnel and vital supplies they would not otherwise have had. In Europe, large numbers of C-47s and C-53s allowed the planning and execution of major airborne operations and provided critical logistical support to Allied armies advancing toward Germany. In the Pacific, C-47s (with Navy R4Ds) made it possible to rapidly move troops and supplies across the islands and archipelagos of those campaigns. And efforts to re-supply beleaguered Chinese forces over the Himalayan Mountain Range (the “Hump”) was originally achieved by C-47s until the larger Curtiss C-46s began taking over in mid-1943.

Although thousands of C-47s were declared surplus and sold off after World War II ended, large numbers still remained active in the postwar AAF (became the independent USAF after September 1947). During 1946 and 1947, since high-altitude operations had become largely unnecessary, many C-47Bs had their superchargers removed and returned to service as C-47Ds. When the Soviets closed the Berlin corridor in June 1948, USAF C-47s and RAF *Dakotas* carried the initial brunt of re-supply operations (i.e., the Berlin Airlift, June 1948–May 1949) until sufficient numbers of Douglas C-54s could be activated.

As newer types of tactical transports (e.g., Fairchild C-82, -119, and -123) began taking their place during the postwar era, many C-47s were adapted to non-transport roles and identified by new prefixes. The “S” prefix, as with the SC-47A and SC-47D, indicated aircraft equipped for search and rescue operations (re-designated HC-47A/D in 1962). Eight C-47As and Bs, after being refitted with 1,450-hp P&W R-2000-4 engines plus electronics, became C-47E airways (navigation beacon) survey aircraft for the Military Air Transportation System (MATS). The “V” prefix, as with VC-47A and VC-47D, was applied to C-47 variants reconfigured with new interiors for staff transportation duties. During the Korean War (1950–1953), RC-47As (AC-47A initially, re-designated EC-47A in 1962) received ECM equipment to monitor Soviet radio and radar frequencies and also dropped flares in support of tactical air operations.

From the early 1950s to the early 1960s, some 36 USAF and Navy C-47s/R4Ds were transferred to the U.S. Army: two C-47As, one VC-47A, three C-47Bs, one C-47B that was re-designated NC-47B after being modified to serve as an electronics testbed, all eight of the C-47Es used for navigation surveys, ten R4D-5s (C-47H after 1962), one R4D-5 that was re-designated NC-47H after being modified to serve as an electronics testbed, one R4D-5R (TC-47H after 1962), seven R4D-6s (C-47J after 1962), and two R4D-7s (TC-47K after 1962). The Army retired the final example, a C-47H, in 1982.

In the mid-1960s, when most USAF “Gooney Birds” (the latter-day knick-name for C-47s) had been in service over 20 years, a new war in Southeast Asia saw these veteran aircraft being adapted to new military roles. From 1964 to 1966, 53 C-47Ds underwent conversion to AC-47D (initially FC-47D) side-firing gunships armed with three 7.62-mm rotary machine guns. Known by the call sign “Spooky,” AC-47Ds successfully defended 3,926 different positions during night operations from 1966 to 1969, when they were replaced by newer types of gunships. A small number of C-47As assigned to the 460th Tactical Reconnaissance Wing in Vietnam became EC-47N, EC-47Ps, and EC-47Qs when they were specially equipped as airborne relay facilities (ARF) and for electronic intelligence (ELINT) to monitor Viet Cong and North Viet-





**Thirty-six USAF C-47s and Navy R4Ds were transferred into postwar U.S. Army service as the C-47J. Note addition of nose radar.**

namese radio and radar networks. N and Ps differed in the radio bands covered while Qs had an updated digital electronic suite and more powerful R-2000 engines. The ECs served in the combat theater from 1966 to 1971. Although the last C-47D was withdrawn from the USAF inventory in 1975, at least one example, refitted with 1,624-hp Pratt & Whitney PT6A-67R turboprop engines, is known to be currently serving with the 6th Special Operations Squadron as the C-47TP.

*Naval Variants:* Although the first Navy R4D-1s (AAF C-47) were ordered in late 1940, none became operational until early 1942. The first two DC-3s actually placed on the naval inventory were *Cyclone*-powered variants impressed from an Eastern Airlines order in early 1941 and went into service as the R4D-2. As deliveries commenced, R4Ds became the most numerous Navy, Marine, and Coast Guard transport aircraft of the wartime era, which from 1942 to 1945, included 100 R4D-1s, 20 R4D-3s (AAF C-53D), 17 R4D-4s (impressed civil airliners), 238 R4D-5s (AAF C-47A), 157 R4D-6s (AAF C-47B), and 44 R4D-7s (AAF TC-47B). The R4D-2s and -4s, saw service mainly as VIP and staff transports, whereas most R4D-1s, -5s, and -6s were assigned to the Naval Air Transportation Service (NATS), operating from bases on both U.S. coasts to provide logistical support to various combat commands in the Pacific and Atlantic. R4Ds allocated to the Marines were organized into eight squadrons that served primarily in the Pacific theater. Eight R4D-5s were transferred to the Coast Guard during 1943 and 1944 where they were used mainly to support search and rescue operations.

Following World War II, like USAF C-47s, a number of remaining Navy and Marine R4Ds were adapted to more specialized roles, and various suffixes were added to their designations: R4D-5Z and -6Z, reconfigured as staff and VIP transports; R4D-5R and -6R, converted to 21-seat personnel transports; R4D-5E and -6E, ECM equipment added for electronic warfare (EW); R4D-5L and -6L, increased fuel and winterization necessary for Antarctic operations; R4D-5T and -6T, reconfigured as navigation trainers; R4D-5Q and -6Q, modified as ECM trainers; and





Navy R4D-5 shown in the 1950s while attached to NAS Patuxent, Maryland. Most had been retired by the early 1960s.

R4D-5S and -6S, converted to antisubmarine warfare (ASW) trainers. Most R4D-5 and -6 variants had been removed from service by 1962, but those remaining were re-designated under the tri-service system: R4D-5 to C-47H; R4D-5L to LC-47H; R4D-5Q to EC-47H; R4D-5S to SC-47H; R4D-5T to TC-47H; R4D-5Z to VC-47H; R4D-6 to C-47J; R4D-6L to LC-47J; R4D-6Q to EC-47J; R4D-6S to SC-47J; R4D-6T to TC-47J; R4D-6Z to VC-47J; and R4D-7 to TC-47K. All were retired from active Navy and Marine service during the late 1960s. One hundred and one Navy R4D-5s and -6s that underwent the Super DC-3 conversion in 1951 are reported separately as the R4D-8/C-117D in Part B, below.

### Beech C/UC-43 (JB/GB)—1937

Technical Specifications (C/UC-43)

Type: Staff and passenger transport.

Manufacturer: Beech Aircraft Co., Wichita, Kansas.

Total produced: 396 (314 USAAC/AAF; 82 USN/USMC).

Capacity: One pilot plus four passengers.

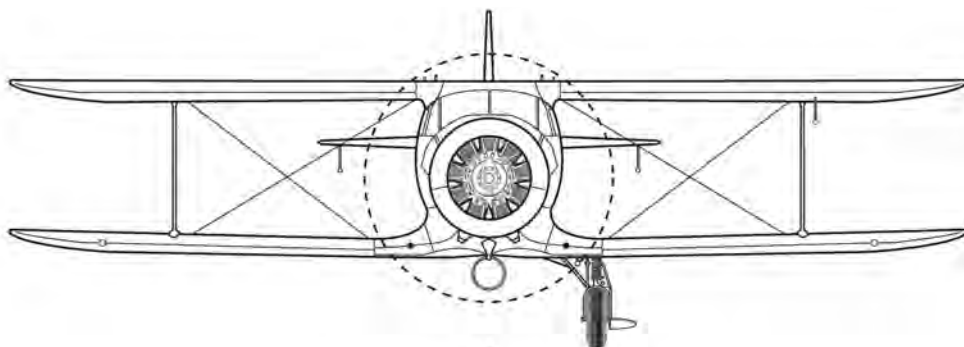
Powerplant: One 450-hp Pratt & Whitney R-985-50 *Wasp Junior* 9-cylinder air-cooled radial engine driving two-bladed, variable-pitch Hamilton Standard metal propeller.

Performance: Max. speed 212-mph, cruise 202-mph; ceiling 25,000 ft.; range 670 mi.

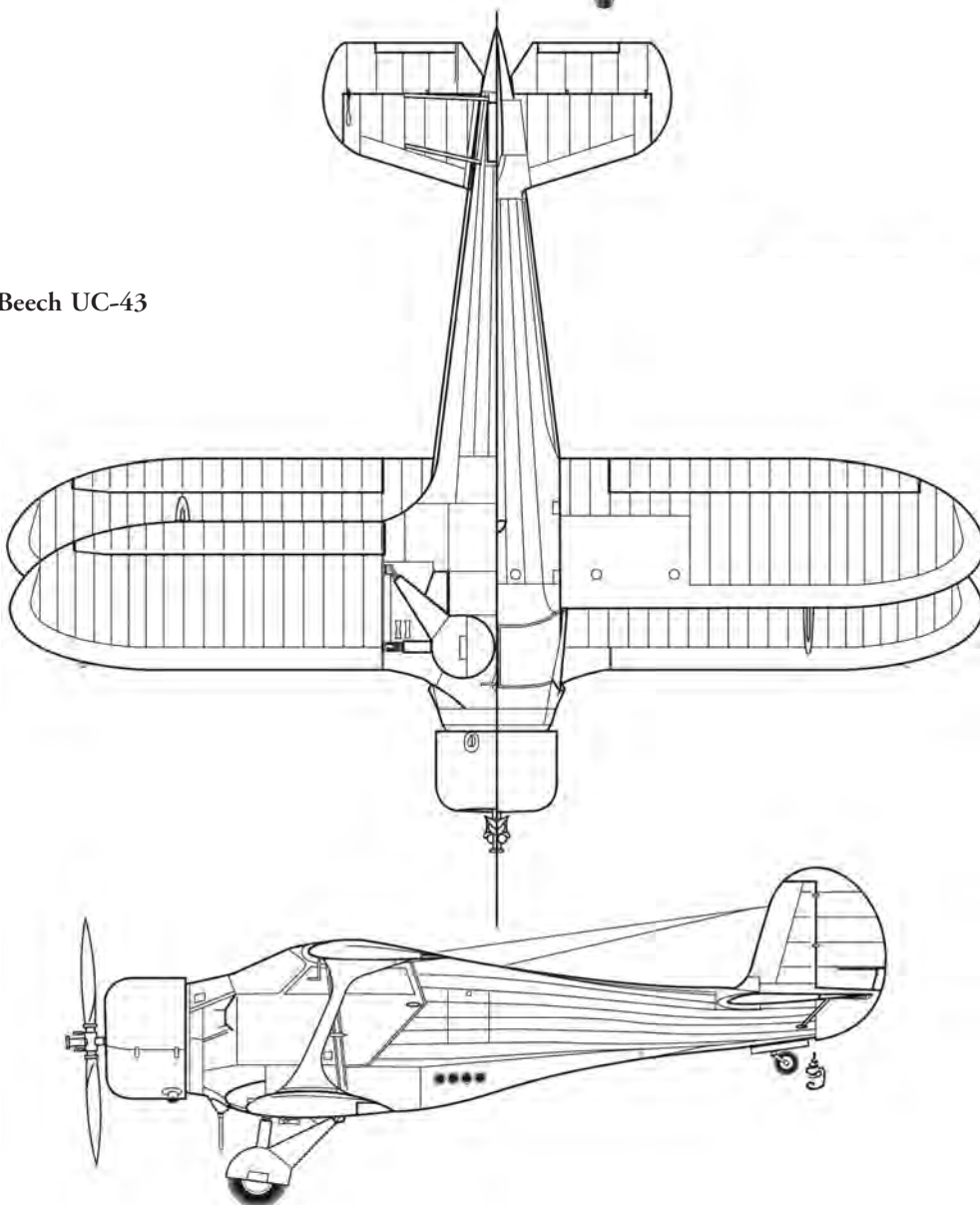
Weights: 2,540 lbs. empty, 4,250 lbs. loaded.

Dimensions: Span 32 ft., length 26 ft. 10 in., wing area 297 sq. ft.

The legendary Beech Model 17 “Staggerwing” made its debut as a fixed-gear civil aircraft in late 1932, and the retractable-gear B17L of 1934 became the first production model. Of mixed construction, with a welded, steel tube fuselage and built-up wooden wings, all Model 17s were distinguishable by the obvious back stagger of their upper wing and a fuselage that gracefully faired into in a rounded fin and rudder. Following evaluation of a D17S demonstrator (P&W R-985-17 engine) in late 1938, the Air Corps purchased three examples under the designation



Beech UC-43





AAF UC-43B seen in wartime colors was one of the 13 civil D17Ss which had been impressed into military service by the government during 1942.



Navy GB-2 just before World War II, essentially the same as the civil model D17S. Typically, they were assigned to various air stations as utility transports.

YC-43 and assigned them to the U.S. Air Attachés in London, Paris, and Rome. The first order in quantity came in early 1942 for 270 D17S models as the C-43 (UC-43 after early 1943), 63 of which were allocated to the Navy as the GB-2. And starting in 1942, another 104 civil Model 17s were taken into AAF service under impressments orders: 13 D17Rs (Wright R-975 engines) as the C/UC-43A; 13 D17Ss (P&W R-985 engines) as the C/UC-43B; 38 F17Ds (Jacobs R-915 engines) as the C/UC-43C; 23 E17Bs (Jacobs R-830 engines) as the C/UC-43D; 5 C17Rs

(Wright R-975 engines) as the C/UC-43E; 10 C17Bs (Jacobs R-830 engines) as the C/UC-43G; three B17Rs (Wright R-975 engines) as the C/UC-43H; three C17Ls (Jacobs R-755 engines) as the C/UC-43J; and one D17W (Wright R-975 engine) as the C/UC-43K, formerly the personal aircraft of aviatrix Jacqueline Cochran. C/UC-43 variants were typically employed as staff transports for AAF and government personnel, and some saw service with Army units in the liaison role. They were sold surplus soon after the war ended.

*Naval Variants:* In late 1937, the Navy purchased a C17R powered by a 420-hp Wright R-975-E2 engine under the designation JB-1 and assigned it as a command staff transport. BuAer procured a further 10 D17S models in 1939 as the GB-1 which were assigned as utility transports at various air stations and also with the Naval Attachés in Madrid and Mexico City. Sixty-three C-43s (D17S) ordered by the AAF in 1942 were subsequently allocated to the Navy as GB-2s, and within the same timeframe, eight more civil D17S models were impressed into naval service as GB-1s. Two GB-1s and at least one GB-2 served with the Marines during World War II. All Navy and Marine GBs were removed from active service during 1946.

## Messerschmitt C-44 —1939

Technical Specifications (XC-44 [Bf.108B])

Type: Staff transport.

Manufacturer: Bayerische Flugzeugwerke AG, Augsburg, Germany.

Total produced: 1 (USAAC).

Capacity: One pilot plus three passengers.

Powerplant: One 240-hp Argus 10C 8-cylinder air-cooled inverted inline engine driving a two-bladed, fixed-pitch metal propeller.

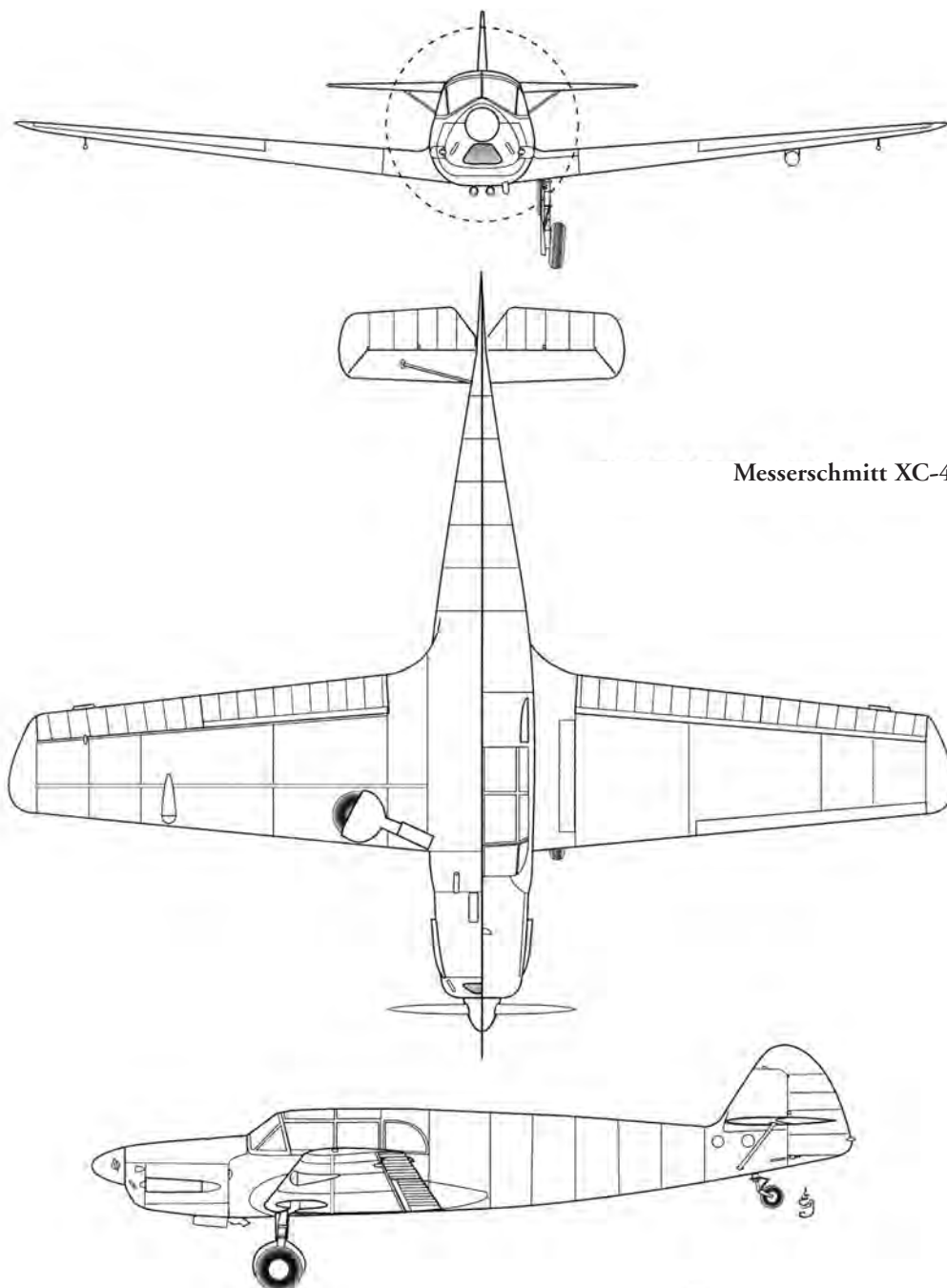
Performance: Max. speed 186-mph, cruise 161-mph; ceiling 25,000 ft.; range 670 mi.

Weights: 1,775 lbs. empty, 2,976 lbs. loaded.

Dimensions: Span 34 ft. 5 in., length 27 ft. 2 in., wing area 172 sq. ft.



Civil-registered Bf.108b of the same type used by the military Air Attachés in Berlin from 1939 to 1941. Swastika required by German law.

**Messerschmitt XC-44**

A direct predecessor of the famed Bf.109 fighter, the Willi Messerschmitt-designed Bf.108 Taifun (Typhoon) was initially introduced in 1934 as the M-37 four-seat sportplane. The most numerous variant, the Bf.108b, appeared in 1935 with an uprated Argus 10C engine and small aerodynamic improvements. A single Bf.108b was purchased by U.S. government in the spring of 1939 for the use of the Military Air Attachés in the American embassy in Berlin and thereafter placed on the Air Corps inventory as the XC-44. It was flown locally on staff and liaison duties



by Air Corps and Navy pilots attached to the embassy. Historical records indicate that the aircraft was grounded in the fall of 1941 and seized by the German government soon after war was declared in December.

### **Beech C/UC-45 (JRB/SNB)—1940**

Technical Specifications (UC-45F)

Type: Passenger and utility cargo transport.

Manufacturer: Beech Aircraft Co., Wichita, Kansas.

Total produced: 2,765 (1,745 USAAC/AAF/USAF, and U.S. Army [not including AT-7 and -11 trainer variants]; 1,020 USN/USMC/USCG [including postwar upgrades to SNB-4 and -5]).

Capacity: Crew of one or two plus six passengers or 3,000 lbs. of cargo.

Powerplant: Two 450-hp Pratt & Whitney R-985-AN-1 *Wasp Junior* 9-cylinder air-cooled radial engines driving two-bladed, variable-pitch Hamilton Standard metal propellers.

Performance: Max. speed 206-mph, cruise 197-mph; ceiling 20,000 ft.; range 1,000 mi.

Weights: 5,844 lbs. empty, 8,725 lbs. loaded.

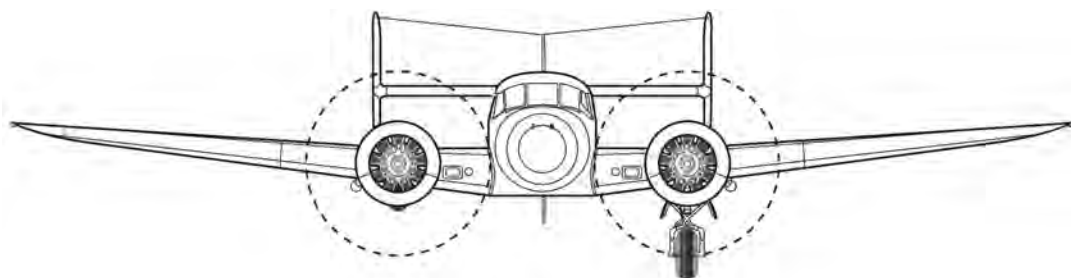
Dimensions: Span 47 ft. 8 in., length 34 ft. 8 in., wing area 349 sq. ft.

Known over its long history as the “Twin Beech,” the maiden flight of the legendary Model 18 took place on January 15, 1937. Powered at first with 350-hp Wright R-760 engines (Model 18A), it emerged as a very clean monoplane constructed of aluminum alloy, with metal-framed, fabric-covered control surfaces, retractable landing gear, and a distinctive twin-fin empennage. Beech initially marketed the type as either a small airliner or business transport, available in five different powerplant options. Sales were relatively modest, however, until the introduction of the *Wasp Junior*-powered Model 18S in 1939, which marked the point when Beech first began receiving military orders, starting with an Army contract in late 1939 for 25 B18S models, 11 as five-passenger light transports under the designation C-45, plus 14 specially configured for photo-survey work as the F-2. Twenty more B18S models with six-passenger interiors joined the Air Corps inventory in 1941 as the C-45A.

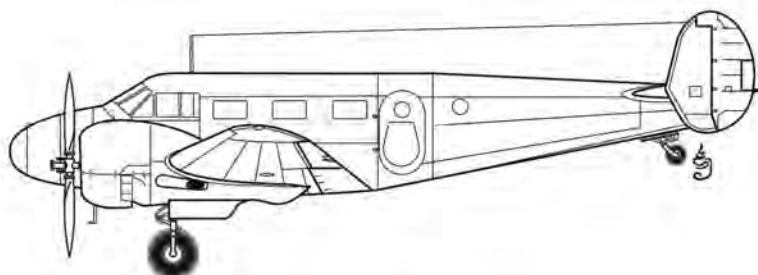
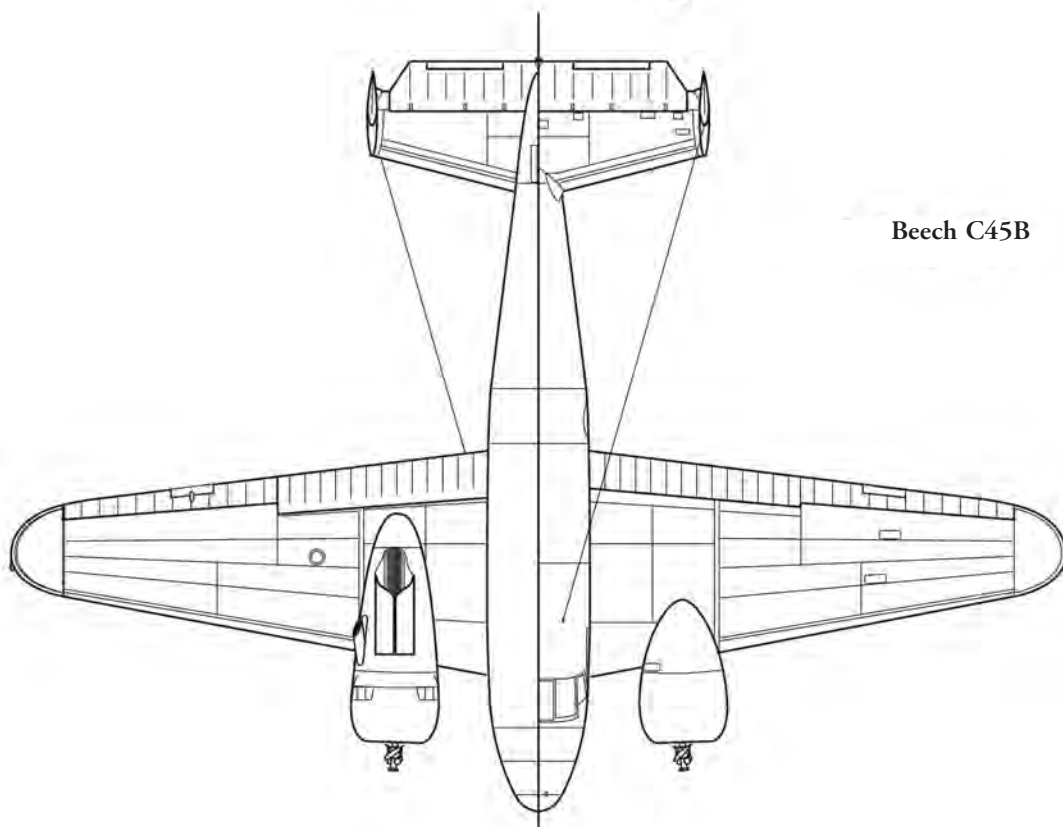
During World War II approximately 5,300 Beech 18 derivatives were manufactured for the American armed forces under a series of government contracts. Of this total, 3,553 were dedicated trainers (1,462 AT-7s and 2,091 AT-11s), with the remaining 1,745 delivered under AAF serial numbers from 1942 to 1945 as the C-45B and C/UC-45C, D, E, and F. The 223 C-45Bs came with eight seats and featured minor interior changes, and two civil B18Ss were impressed into AAF service as UC-45C. The two UC-45Ds and six UC-45Es were ordered as AT-7s but reconfigured as communications aircraft on the assembly line. Starting in 1943, Beech delivered the first of 1,522 UC-45Fs with five inches added to the fuselage so the cockpit could be moved slightly forward. During World War II, AAF C/UC-45 transport variants were widely dispersed among many wartime commands and bases in the U.S. and in virtually every combat theater where they were used for staff duties and to transport personnel and light cargo.

Significant numbers of U/UC-45s were retained in postwar active and reserve AAF service (became USAF in September 1947). During 1951 the USAF implemented a modernization program in which 372 C-45, AT-7, and AT-11 variants were returned to service as the C-45G under new serial numbers after being completely rebuilt and retrofitted with new wing center sections, new landing gear, constant-speed propellers, improved instruments and avionics, and autopilots; plus, a further 96 specifically equipped for navigator training reentered service as the TC-45G. In an analogous modernization program commenced in 1952, another 432 C-45s, AT-7s, and AT-11s received new USAF serials as the C-45H, which included larger engine nacelles in addition to the G modifications but lacked autopilots. Through the 1950s and into the early 1960s,





Beech C45B





Seen in wartime colors, this photograph depicts one of the 20 B18S models that joined the Air Corps inventory in 1941 as the C-45A, later redesignated UC-45A.



Rebuilt C-45H in postwar USAF service, this particular example being attached to Strategic Air Command as a utility and staff transport.

C-45Gs/Hs served with all major USAF commands for staff, logistics, liaison, and administrative functions. As they were retired from service, some were transferred to reserve and ANG units but most were sold surplus; the Army acquired one ex-USAF C-45H as a liaison transport in 1953.

*Naval Variants:* In mid-1940, under the naval designation JRB-1, BuAer contracted with Beech to produce 11 aircraft, five very similar to the Army's F-2 but with elevated cockpits to accommodate drone controllers, plus six identical to the C-45. Late in 1940 the Navy ordered 15 aircraft indistinguishable from the Army C-45A that reached service in 1941 as the JRB-2, three of which were allocated to the Marines. During World War II production, under AAF



**SNB-5, probably a refurbished SNB-2, seen in orange and white postwar reserve colors while serving at NAS Philadelphia, Pennsylvania.**

assigned serials, the Navy received 20 C-45Bs as JRB-2s and 385 UC-45Fs as JRB-3s and -4s, as well as 320 AT-7s as SNB-1s and 509 AT-11s as SNB-2s. While some Navy JRBs served in squadrons and with naval attachés at diplomatic posts, most were assigned directly to U.S. and overseas bases as utility and staff transports. Marine JRBs were variously assigned to Base Air Detachments (BAD), Headquarters Squadrons (HQSQ) and Marine Air Wings (MAW). From 1943 to 1945, six ex-Navy JRB-4s were allocated to the Coast Guard for administrative and staff duties.

Following the war, similar to USAF programs, many Navy and Marine JRBs and SNBs were subjected to major modifications intended to extend service life. Initially, BuAer contracted with Beech in 1947 to rebuild and modernize 117 SNB-1s for instrument and multi-engine proficiency, and they reentered service as SNB-4s. In 1951, as a corollary to USAF C-45G program, an unspecified number of JRB-3s/-4s and SNB-2s re-emerged as SNB-5s after being completely rebuilt and modified, and some, specialized for photographic training, became SNB-5Ps. A small number of JRB-3s and -4s receiving only new wing center sections and constant-speed props returned to service as the JRB-6. All SNB-4s and JRB-6s were stricken from the naval inventory during the late 1950s, while many SNB-5s and -5Ps continued to serve with Navy and Marine reserve units for flight proficiency and as utility hacks. In 1962, after adoption of the tri-service system, the SNB-5 was re-designated TC-45J and the SNB-5P, RC-45J, and a few not assigned to squadrons were carried as the UC-45J. A number of ex-navy TC/RC-45Js transferred to the Army served in various transport and test roles until the late 1960s. The very last TC-45J was withdrawn from Navy service in mid-1972.

## Curtiss C-46, C-55, and C-113 (R5C)—1941

### Technical Specifications (C-46A)

Type: Troop and cargo transport.

Manufacturer: Curtiss Airplane Div., Curtiss-Wright Corp., Buffalo, New York and St. Louis, Missouri.

Total military versions: 3,182 (3,022 USAAC/AAF/USAF; 160 USMC/USCG).

Capacity: Crew of four plus 50 troops or 11,600 lbs. of cargo.

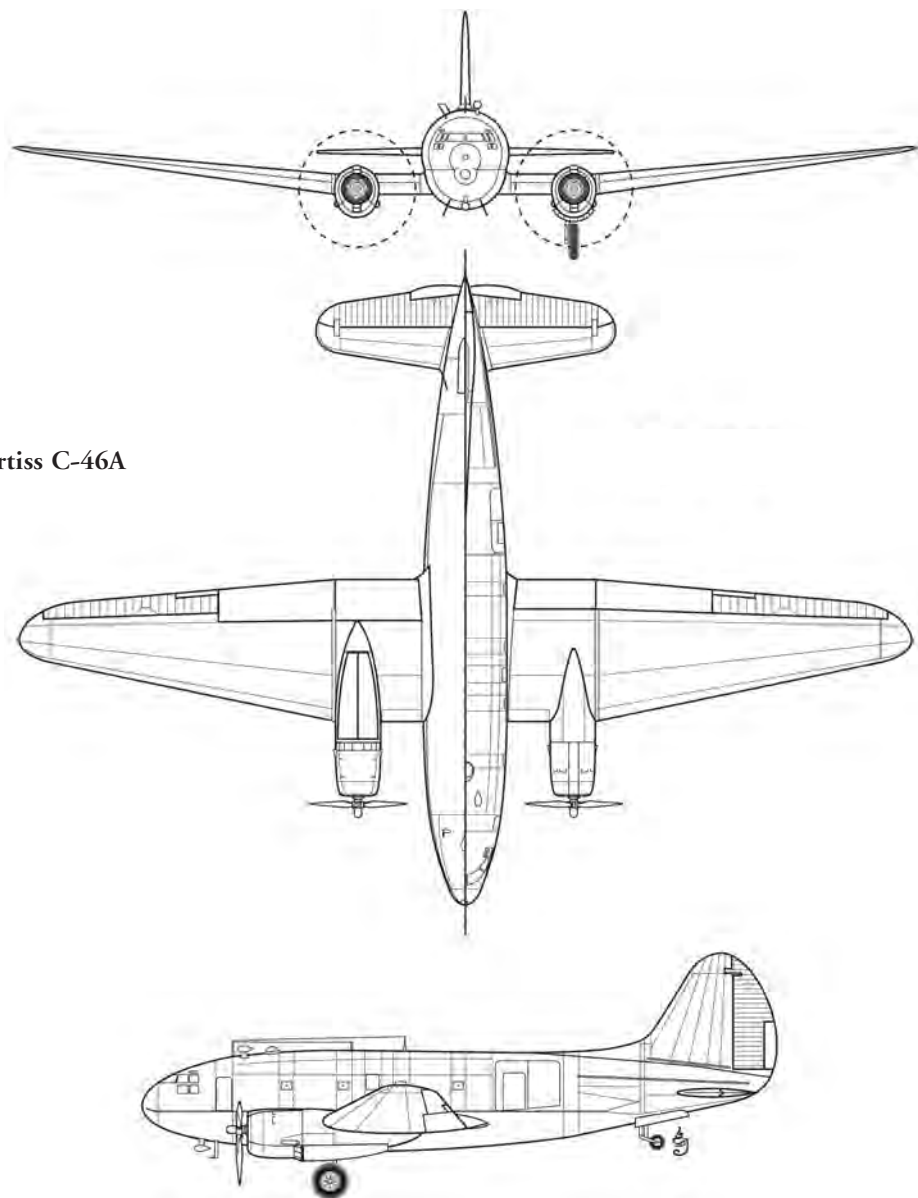
Powerplants: Two 2,000-hp Pratt & Whitney R-2800-51 *Double Wasp* 18-cylinder air-cooled radial engines driving four-bladed Curtiss electric fully controllable metal propellers.

Performance: Max. speed 270-mph, cruise 173-mph; ceiling 24,500 ft.; range 3,150 mi.

Weights: 30,000 lbs. empty, 49,600 lbs. loaded.

Dimensions: Span 108 ft. 1 in., length 76 ft. 4 in., wing area 1,360 sq. ft.

Curtiss C-46A



In early 1937 Curtiss engineer George A. Page began laying down the design for the CW-20, a twin-engine, medium range (i.e., 600–800 miles) airliner intended to compete against the Douglas DC-3 in a rapidly growing American air transportation market. It could be configured in either 30-seat day or 16-berth sleeper versions and featured a fuselage configuration that offered pressurization in the crew and passenger compartments plus a spacious cargo bay beneath the floor of the main cabin. In order to minimize frontal drag, Page created a unique “double-bubble” fuselage cross-section — two intersecting circles of different diameters — that converged at the floor of the upper main cabin, which also permitted the main wing spar to pass below the passenger cabin. The lower level of the bubble resulted in a cargo compartment of 455 cubic feet that was located near the aircraft’s center-of-gravity. Other aerodynamic innovations included a cockpit/windscreen enclosure that completely blended-in with the nose contour, a “tunnel cowl” designed to duct air through the bottom of the cowl, fully enclosed main and tail wheels, and butt-joining and flush riveting of metal skins. For added safety, the control system included a “gyropilot” that provided one-axis directional control and would boost the rudder in the event of an engine failure on takeoff. Originally, the empennage consisted of twin fins and rudders with dihedral in the horizontal stabilizer, believed at the time to offer better pitch and yaw stability and permit wider variations in the center-of-gravity. Page decided to power the prototype with 1,700-hp Wright R-2600-C14 *Twin Cyclones*, the most powerful radial engines readily available at the time.

When it made its first flight on March 26, 1940, the CW-20 prototype was largest twin-engine aircraft in the world. In terms of sheer size and load, it was larger than the DC-3 by a factor of one-third, and was roughly comparable in overall performance to the four-engine Boeing 307 Stratoliner. In mid-1940, after testing raised concerns over tail flutter and structural integrity, the prototype was modified to incorporate a single-fin arrangement. About the same time, the Army Air Corps (became AAF in 1941) indicated an interest in acquiring military versions of the new type, subsequently awarding Curtiss a contract to produce 46 examples under the designation C-46 and specifying a switch from R-2600 engines to the newer Pratt & Whitney R-2800 *Double Wasps* of 2,000-hp each. The CW-20 prototype was delivered for evaluation to the AAF in June 1941 as the one and only C-55. It was returned to Curtiss in December 1941, then sold to British Overseas Airways Corporation, where it was employed as a transport until being scrapped sometime in 1943 for lack of spare parts. America’s rapid movement toward a wartime footing during 1941 effectively put to rest any plans to produce the CW-20 commercially. Deliveries of the first 25 C-46s to the AAF commenced in July 1942, after which production shifted to the unpressurized C-46A. Other modifications to the A included deletion of the fairing over the fuselage seam, reduction of the number of side windows to five, plus the addition of double cargo doors, a hydraulic cargo winch, and a reinforced floor. A total of 1,454 C-46As were delivered starting in late 1942, succeeded in production by delivery of 1,410 C-46Ds in 1944 and 1945, which differed in having a single door built into the cargo doors to facilitate paratroop operations.

The one-off XC-46B was an experimental model that featured a stepped windscreen similar to the C-47 and R-2800-34W engines with water injection. Seventeen C-46Es were completed with the stepped windscreen of the XC-46B, a single cargo door, and came with three-bladed Hamilton-Standard propellers rather than the Curtiss electric four-bladed types used on previous variants. The C-46E was followed by 234 C-46Fs, which retained the nose contour of the C-46A/D but included the other refinements of the C-46E plus squared-off wingtips. The sole C-46G had a stepped windscreen and squared wingtips and was to have followed the C-46F, however, the AAF canceled production plans when the war ended. At least two C-46 proposals were never completed: a C-46H with dual tailwheels and a C-46K to be powered by 2,500-hp





**AAF C-46A seen toward the end of World War II in natural metal finish. C-46s saw extensive employment in the China-Burma-India Theater where they were used to fly supplies over the “Hump” (Himalayan Mountain Range).**

Wright R-3350 engines, however, three listed as XC-46Ls with R-3350 engines were tested in 1945. The single C-46G became the XC-113 after it was fitted with one General Electric TG-100 turboprop engine as a flying testbed but was wrecked in a ground accident before it flew. When wartime production of the C-46 finally ended, a total of 3,182 aircraft in all variants had been completed.

The first production C-46s, by this time dubbed the “Commando” by the Curtiss factory, were initially delivered to the Military Transport Division (MTD) of Eastern Air Lines during the middle of 1942 for service evaluation, and by September, had been placed in MTD service along the South Atlantic ferry route. Due to its superior range, operating altitude, and lifting capacity, the C-46 saw its most extensive employment in the China-Burma-India (CBI) theater, where it was used to ferry supplies over “the Hump” (Himalayan Mountains) between India and China. During wartime service, the C-46’s maximum overload takeoff weight rose to 50,000 lbs. (and often more than that, according to unofficial sources); and in the CBI theater particularly, C-46s were routinely required to sustain flight operations under primitive conditions — airfields and local maintenance — for which they had never been intended.

After World War II ended, many C-46s remained in active AAF/USAF service with some being assigned to reserve units, however, a majority were placed either in “mothballs” (military storage) or sold as surplus. The USAF operated C-46s in various active and reserve Troop Carrier and Air Transport units until they were replaced by Fairchild C-119s and C-123s during the 1950s. The last active USAF C-46s were used by the 1st Air Commando Group for jungle supply drops and deliveries during the Vietnam War, the final examples being retired in 1968.

*Naval Variants:* In late 1942 BuAer requested allocation of 160 C-46As from AAF production which would be assigned to Marine transport operations in the Pacific under the assigned naval designation R5C-1. Although the first R5C-1s arrived in February 1943, the Marines had received





**Marine R5C-1 seen while serving with VMR-253 early in the Korean War. The unit transitioned to Fairchild R4Qs (C-119) before deploying overseas.**

only 30 by the end of the year due to AAF priorities in the BCI Theater, and during 1943, another 10 C-46As were delivered to the Coast Guard as the R5C-1. R5C-1s initially equipped two Marine squadrons, VMR-252 and VMR-952, and by mid-1945, equipped four more, VMR-253, VMR-352, VMR-353, and VMR-953. After forming at U.S. bases, Marine R5C units began supporting combat operations in the Pacific during 1944 and participated in all major amphibious campaigns through the end of the war. In addition to transporting personnel and supplies, Marine R5C-1s saw wide use for medical evacuation of wounded. Though most Marine R5C-1s were withdrawn in 1946 and 1947, some remained active until replaced by Fairchild R4Q-1s (USAF C-119s) during the early and mid-1950s. Several ex-Marine examples reassigned to the Navy for training at NAS Memphis were re-designated R5C-1T and another converted to a VIP configuration became the R5C-1Z in 1946. The last Marine R5C-1 was retired in 1954.

## **Douglas C-54, C-114, C-115, and C-116 (R5D)—1942**

### **Technical Specifications (C-54D)**

Type: Long-range passenger, troop, and cargo transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California and Chicago, Illinois.

Total military versions: 1,170 (968 AAF/USAF and U.S. Army; 201 USN/USMC/ USCG).

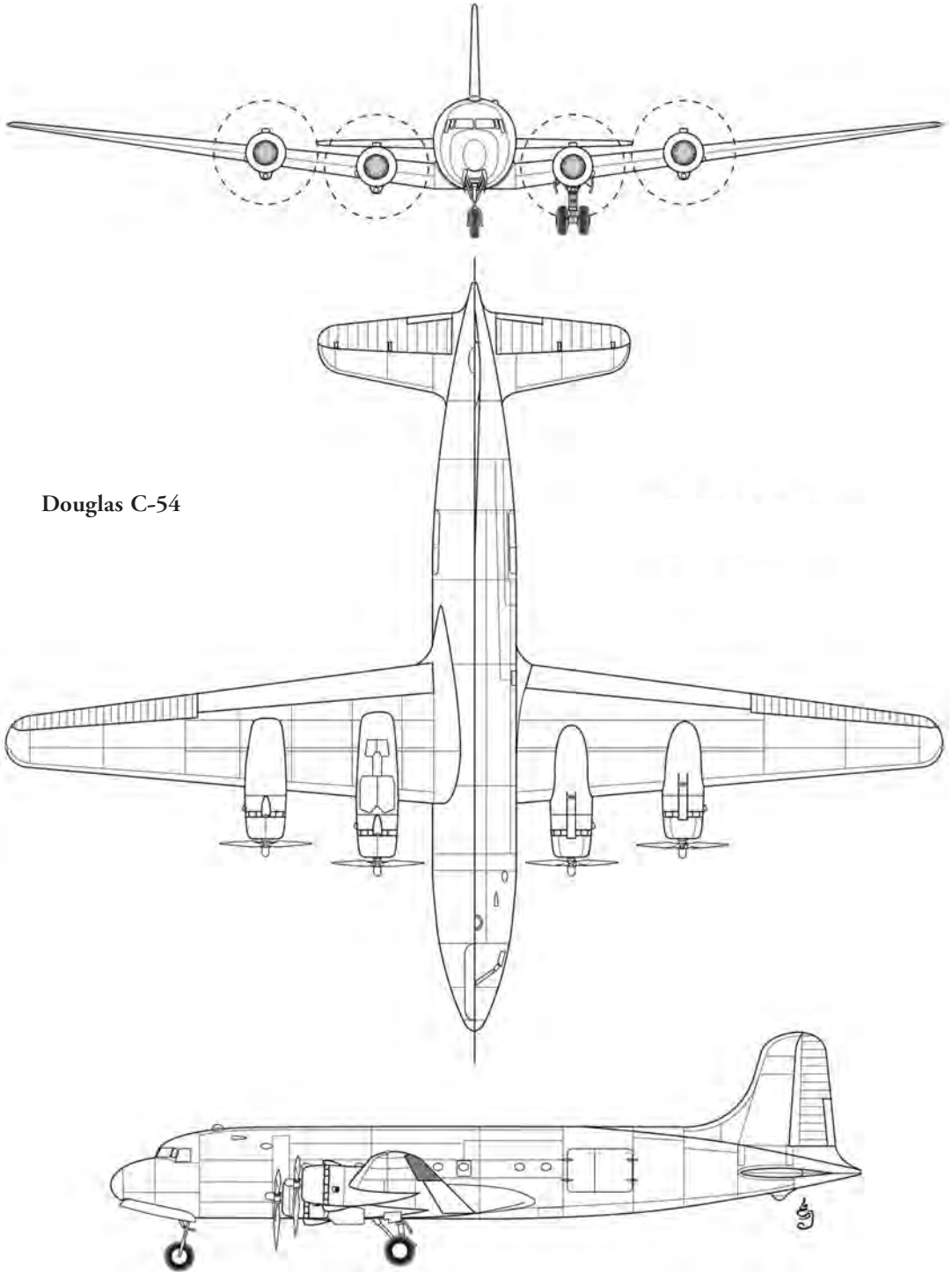
Capacity: Crew of four plus 50 troops/passengers or 15,600 lbs. of cargo.

Powerplants: Four 1,350-hp Pratt & Whitney R-2000-11 *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 275-mph, cruise 190-mph; ceiling 22,350 ft.; range 3,100 mi.

Weights: 38,930 lbs. empty, 62,000 lbs. loaded, 73,000 lbs. max. takeoff.

Dimensions: Span 117 ft. 6 in., length 93 ft. 10 in., wing area 1,460 sq. ft.



Douglas C-54

What ultimately became the military C-54 originated in 1936 as a commercial venture supported by five airlines (TWA, Eastern, American, United, and Pan American) for Douglas to develop a four-engine passenger transport for long-range domestic and international routes. However, the resulting DC-4E (experimental), after undergoing extensive service testing in 1938 and 1939, was rejected by the airlines due to high operating costs. Returning to the drawing boards, the Douglas design team led by Arthur Raymond created the 15 percent smaller and aerodynamically refined DC-4A to be powered by R-2000-3 engines, but before a prototype could be completed, the entire project was commandeered by the U.S. Government in 1941 and ordered into production under AAF serial numbers as the C-54. The airliner configuration was replaced by a military specification calling for a reinforced floor, internal cargo hoist, clamshell-type rear cargo doors, and fuselage fuel cells.

The flight of the first C-54 (no experimental prototype) took place on February 14, 1942, and delivery of 23 essentially identical production models began soon afterward — an extraordinary accomplishment by Douglas for an aircraft of such size and complexity. Sometime during early production, the factory name “Skymaster” was adopted for the C-54 series. From mid-1942 to early 1943, Douglas produced 252 C-54As with improved R-2000-7 engines, and then from mid-1943 to early 1944, the Santa Monica assembly line shifted to production of 220 C-54Bs with increased fuel capacity in the wing tanks. One C-54A became the VC-54C when it was extensively converted to serve as the personal transport to the U.S. President, initially Franklin Roosevelt and later, Harry Truman. As Douglas’s new Chicago plant became operational during 1944, two new C-54 variants began rolling off its assembly lines: 350 C-54Ds with uprated R-2000-11 engines, followed by 125 C-54Es with revised fuel systems and interiors readily convertible to either cargo or VIP passenger seating. A C-54F paratroop version was proposed but never built. The final military production variants, 125 C-54Gs with 1,450-hp R-2000-9 engines, were delivered through 1945.



**Photograph of a nearly new C-54 seen in 1942 or 1943. During the war, the vast majority of C-54s served with ATC on long-range logistical routes. Many were sold to the airlines once the war ended.**



A C-54E serving with the Continental Division of MATS in the 1950s. By this time, international routes had been taken over by newer aircraft like the Douglas C-118 and Lockheed C-121.

There were several experimental variations of the C-54 during its production life: a pressurized version with R-2800 engines was ordered in 1945 as the XC-112 but canceled when the war ended. (Note: the much redesigned XC-112A that did materialize in 1946 became in effect the prototype for the DC-6 and C-118 military variant.) One C-54G converted to four 1,650-hp Allison V-1710-131 inline engines was tested as the XC-114 in 1945 but not ordered into production, and an XC-115 with four Packard V-1650 Merlin engines was projected but never built. Finally, one C-54 modified with thermal de-icing rather than rubber boots was tested in 1945 as the YC-116. Once the war ended, Douglas manufactured a further 79 civil DC-4s with airline interiors, bringing total production to 1,249 aircraft.

As deliveries of C-54s to the AAF proceeded from 1942 onwards, all but a few received assignment to the newly organized Air Transport Command (ATC), where, due to their excellent range, they were employed mainly on transoceanic routes. ATC functioned like a government airline, delivering high value cargo and important personnel to overseas destinations. Within the growing ATC network, C-54s were the first land-based transports capable of establishing direct air service between the continental U.S. and many distant locations in the Pacific, Asia, and Africa. One of the C-54's earliest assignments was a 7,350-mile route (with four intermediate stops) between San Francisco, California, and Brisbane, Australia, and by 1945, they were routinely flying a worldwide route structure. Following the V-J Day demobilization, hundreds of AAF C-54s were declared surplus and quickly acquired by the airlines, however, over 300 were retained for airlift duties in postwar AAF service (became USAF in 1947).

During the Berlin Airlift (June 1948-May 1949), USAF C-54s (some from MATS but most from Heavy Troop Carrier Groups in TAC) formed the backbone of the operation, and a just year later, after the Korean War started, they established a vital logistical air link between supply

and maintenance facilities in Japan. As C-54s were succeeded in service by newer aircraft (e.g., C-118s, C-121s, C-124s), many were sold surplus, but some were re-designated after receiving equipment or modifications to serve in other military roles: VC-54D/E/G, staff transports with VIP interiors; AC-54D/E, electronic calibration and communications (re-designated EC-54D/E in 1962); SC-54D/E/G, search and rescue (re-designated HC-54D/E/G in 1962); TC-54D, multi-engine trainer; JC-54D, missile tracking and nose cone recovery; and WC-54D, weather reconnaissance. A single ex-USAF C-54D served with the Army from the late 1950s to the early 1960s for the purpose of transporting missile components. The very last USAF C-54 was retired in 1972.

*Naval Variants:* During wartime production, the Navy received 201 C-54s under AAF serials: 56 C-54As as the R5D-1; 30 C-54Bs as the R5D-2; 86 C-54Ds as the R5D-3; 20 C-54Es as the R5D-4; and 13 C-54Gs as the R5D-5. During World War II, most Navy R5Ds saw service with the Naval Air Transport Service (NATS), which, similar to ATC, transported high value cargoes and personnel over long, over-water routes, primarily in the Pacific Theater of Operations. R5Ds flights were typically dispatched from stateside NATS bases at NAS Norfolk, Virginia, NAS Olathe, Kansas, and NAS Oakland, California.

In the massive naval downsizing that followed the end of World War II, many Navy R5Ds were sold surplus; however, three squadrons were retained in NATS and others continued to be used in administrative and specialized roles. In 1948, after NATS was absorbed into MATS, three Navy R5D squadrons (VR-3, -6, and -8) participated in the Berlin Airlift, and starting in 1950, R5D units were assigned at intervals either to MATS or to the Fleet Logistics Air Wing (FLAW) in support of military operations during the Korean War (1950–1953); and two Marine squadrons (VMR-152 and -352) equipped with ex-Navy R5Ds began operating as part of FLAW in 1950. Postwar suffixes added to R5D designations indicated assignment to specialized roles: R5D-1Z, -2Z, -3Z, -4Z, and -5Z, VIP/staff transports; R5D-3P, photographic survey; and R5D-4R and -5R, personnel transports. Fifteen R5D-3s and -5s allocated to the Coast Guard in 1951 served until 1965. Upon adoption of the tri-service system in 1962, all R5Ds still in service were re-designated as follows: R5D-1Z to VC-54N; R5D-2/-2Z to C/VC-54P; R5D-3/-3Z to C/VC-54Q; R5D-4R to C-54R; R5D-5/-5Z to C/VC-54S; and R5D-5R to C-54T. Coast Guard R5Ds became, respectively, the C-54V (R5D-3) and C-54U (R5D-5). The last Navy example, a C-54Q, was withdrawn from service in 1974.

## Lockheed C-56, C-57, C-59, C-60, C-66, and C-104 (R5O)—1940

Technical Specifications (C-60A)

Type: Passenger, troop, and cargo transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Capacity: Crew of three plus 18 passengers or 6,150 lbs. of cargo.

Total military versions: 523 (429 AAF/USAF; 94 USN/USMC/USCG).

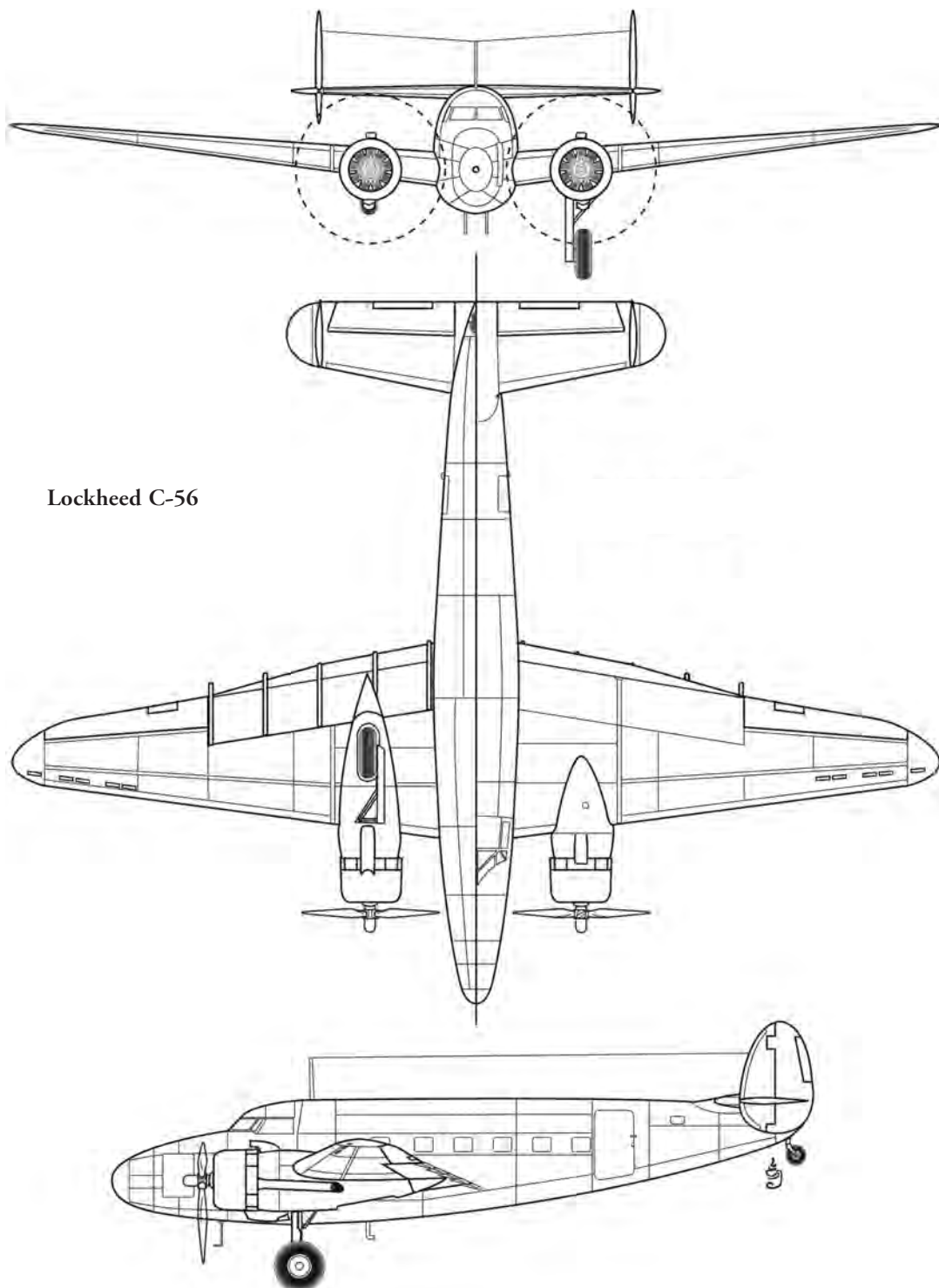
Powerplants: Two 1,200-hp Wright R-1820-87 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 266-mph, cruise 200-mph; ceiling 25,400 ft.; range 2,500 mi.

Weights: 12,500 lbs. empty, 17,500 lbs. loaded, 21,000 lbs. max. takeoff.

Dimensions: Span 65 ft. 6 in., length 49 ft. 10 in., wing area 551 sq. ft.

Lockheed introduced the Model 18 “Lodestar” in 1939 out of a desire to improve the high seat-mile cost that airlines had experienced with the Model 14 (see C-111 and XR4O-1, below). Starting with the Model 14’s overall design, Lockheed gave the new aircraft a five-foot six-inch



Lockheed C-56





**C-60A, the first major military variant, as seen in 1943 with red border surrounding the national insignia. Though fitted out as troop carriers, most saw duty as personnel and cargo transports.**

fuselage stretch and added area to the Fowler flaps in order to maintain comparable takeoff and landing speeds. No Model 18s actually entered AAF service until 1942, when the U.S. Government impressed 105 civil examples from commercial operators and from Lockheed's production line. As they were acquired, the AAF applied the following designations: C-56 series beginning with one as the C-56 (Model 18-50, Wright R-1820-89 engines), one as the C-56A (Model 18-07, Pratt & Whitney R-1690-54 engines), thirteen as the C-56B (Model 18-40, Wright R-1820-97 engines), twelve as the C-56C (Model 18-07, Pratt & Whitney R-1690-54 engines), seven as the C-56D (Model 18-08, Pratt & Whitney R-1690-25 engines), and two as the C-56E (Model 18-40, Wright R-1820-97 engines); C-57 series beginning with thirteen as the C-57 (Model 18-14, Pratt & Whitney R-1830-53 engines) and seven as the C-57B (Model 18-08, with Pratt & Whitney R-1830-53 engines); ten as the C-59 (Model 18-07, Pratt & Whitney R-1690-54 engines); thirty-six as the C-60 (Model 18-56, Wright R-1820-87 engines); and finally, one as the C-66 (Model 18-10, Pratt & Whitney R-1830-53 engines), which was transferred to the President of Brazil in 1945. The designation C-57A was reserved for other impressed Model 18s but not used. Four C-60As built under AAF serials were later re-designated when refitted with different engines: three as the C-57C with Pratt & Whitney R-1830-43 engines and one as the C-57D with R-1830-92 engines. Seven C-59s were subsequently lend-leased to Great Britain and served with the RAF as the *Lodestar IA*.

The first Model 18s built to a military specification under AAF contracts were 324 C-60As delivered in 1942 and 1943. All were fitted out as 18-seat troop transports, powered by Wright R-1820-87 engines. A C-60A modified during construction to test a thermal de-icing system was re-designated XC-60B. A 21-seat version with increased fuel capacity was proposed, initially



Two Model 18 Lodestars were added to the naval inventory in 1940 as the R5O-1. The aircraft depicted served at NAS Anacostia for the use of the Secretary of the Navy and his staff.

as the C-104A and later as the C-60C, but never built. In World War II service, AAF Lodestar derivatives typically saw use in the continental U.S., Southwest Pacific, Caribbean, and South America as staff, personnel, and cargo transports rather than troop carriers in combat zones. Most were sold surplus soon after hostilities ended, though a few continued as fast transports in the postwar AAF/USAF until being withdrawn during the late 1940s.

*Naval Variants:* The first Model 18s to actually enter military service were four civil examples that received naval designations after being purchased in 1940: one Model 18-40 (Wright R-1820-97 engines) delivered to the Coast Guard as the XR5O-1, two Model 18-40s to the Navy as the R5O-1, and one Model 18-07 (Pratt & Whitney R-1690-54 engines) to the Navy as the R5O-2. BuAer procured two Model 18-10s (Pratt & Whitney R-1830-34 engines) in 1941 as the R5O-3, one being assigned to the Marines. All prewar R5Os came with executive interiors and served as VIP transports. During World War II, the Navy impressed 53 civil Model 18-56s (Wright R-1820-87 engines), twelve with 7-seat interiors as the R5O-4, four of which were transferred to the Coast Guard as the R5O-5, plus forty-one with 12-seat interiors as the R5O-4. Between 1943 and 1944, 35 C-60As built under AAF serials as 18-seat troop carriers entered Navy service as the R5O-6, with six subsequently being assigned to the Marines. In wartime service, R5O-6s typically served with transport and ferry squadrons (VR and VRF) while other R5O variants saw use as staff and VIP transports. All Navy, Marine, and Coast Guard R5Os were declared surplus shortly after V-J day.

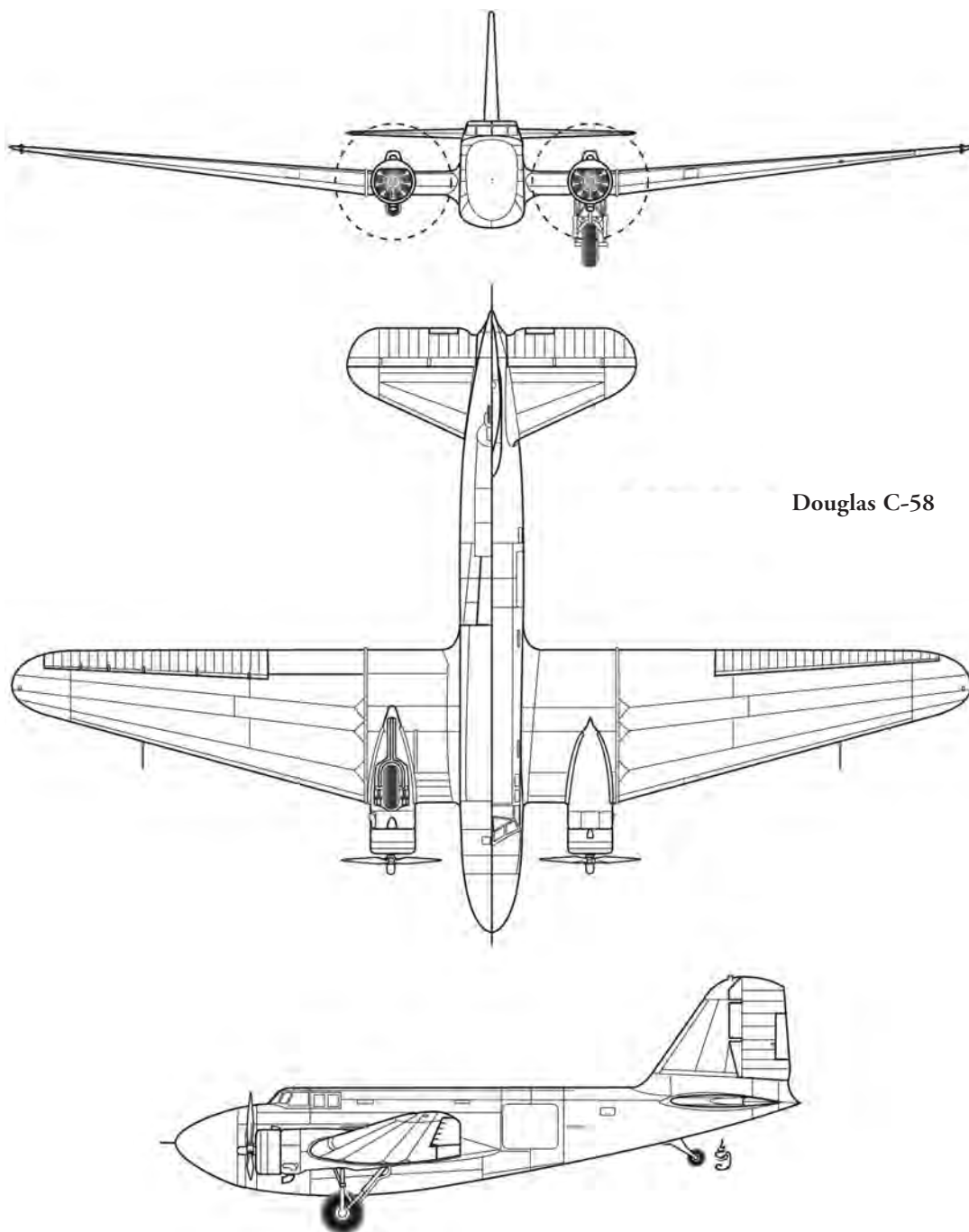
## Douglas C-58 — 1942

Technical Specifications (B-18A)

Type: Converted cargo and personnel transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 2 (AAF).



Douglas C-58

Capacity: Crew of four plus an estimated 15 passengers or 4,440 lbs. of cargo.

Powerplants: Two 1,000-hp Wright R-1820-53 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 216-mph, cruise 167-mph; ceiling 23,900 ft.; range 900 mi.

Weights: 16,320 lbs. empty, 24,000 lbs. loaded, 27,673 lbs. max. takeoff.

Dimensions: Span 89 ft. 6 in., length 57 ft. 10 in., wing area 959 sq. ft.



**A C-58 converted from a B-18 bomber, apparently an inactive static exhibit, depicted in 1950s-era USAF markings.**

In 1942, soon after the U.S. entered World War II, at least two, possibly more, Douglas B-18A bombers received the AAF transport designation C-58 after being stripped of armament and bombing equipment. Douglas evolved the B-18 “Bolo” from the design of the DC-2 transport (see C-32, above) and offered it to the Air Corps in 1935 as a cheaper alternative to Boeing’s Model 299 (XB-17). Under a series of contracts, Douglas delivered 350 aircraft to the Air Corps between 1936 and 1940, 133 as the B-18 and 217 as the B-18A. By early 1942, however, B-18s had largely been displaced by newer aircraft in frontline bombardment units and relegated to secondary duties such as coastal antisubmarine patrol, conversion training, and utility transportation. All were withdrawn from AAF service once World War II ended.

## Fairchild UC-61 and UC-86 (J2K/GK)—1936

Technical Specifications (UC-61)

Type: Utility transport.

Manufacturer: Fairchild Engine & Airplane Corp., Hagerstown, Maryland.

Total military versions: 186 (169 AAF, not including 831 lend-leased.; 17 USN, USCG).

Capacity: One pilot and three passengers.

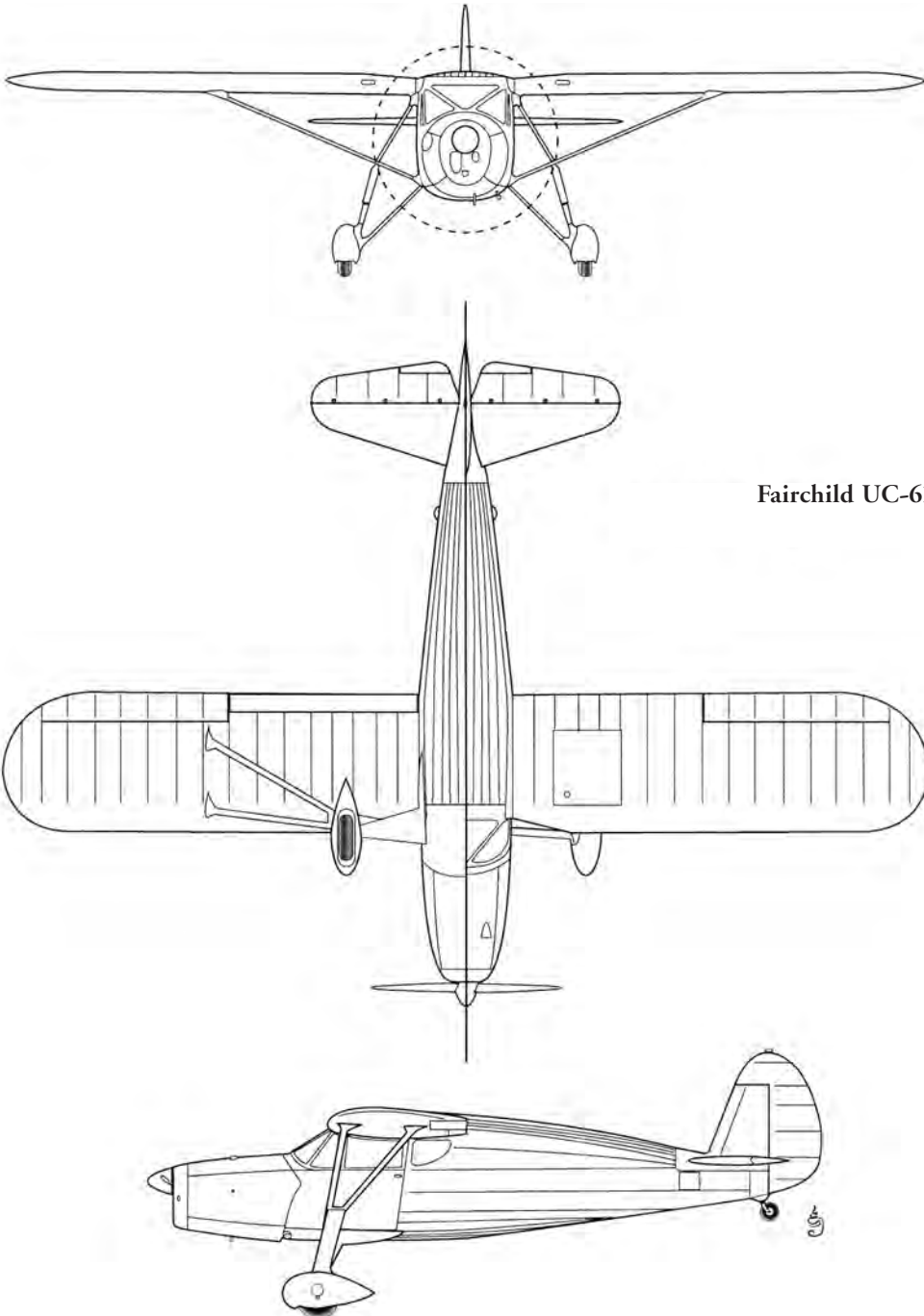
Powerplant: One 165-hp Warner R-500-1 *Super Scarab* 7-cylinder air-cooled radial engine driving a two-bladed, fixed-pitch wooden propeller.

Performance: Max. speed 130-mph, cruise 105-mph; ceiling 16,500 ft.; range 475 mi.

Weights: 1,475 lbs. empty, 2,400 lbs. gross.

Dimensions: Span 36 ft. 4 in., length 23 ft. 8 in., wing area 193 sq. ft.

The Fairchild Model 24C originated in 1932 as a two-seat, high-wing cabin adaptation of the parasol-wing Model 22C, and as the type gained popularity, evolved into a three-seater powered by either a 145-hp Warner radial (C8E) or 145-hp Ranger inline engine (C8F). Model

**Fairchild UC-61F**

24s utilized the fabric-covered construction typical for lightplanes of the day, with a welded, steel tube fuselage and built-up wooden wings, characterized by a wide-stance main landing gear that tied-in to the wing struts. Although the AAF had ordered Model 24s into mass production in 1941 as the UC-61, the first to actually reach AAF service were 23 civilian examples impressed in 1942, as follows: three Model 24W-41s (165-hp Warner engine) as the UC-61A;





Warner-powered AAF UC-61A as seen in 1942 or 1943. Of the 976 UC-61/UC-61As ordered, 830 were Lend-Leased to Great Britain or its Commonwealth Nations.



One of two Fairchild Model 24-C8Fs purchased by the Coast Guard in 1936 under the designation J2K-1. Both aircraft were based at CGAS St. Petersburg, Florida.



one Model 24J (145-hp Warner engine) as the UC-61B; one Model 24A-9 (engine unknown) as the UC-61C; three Model 24Ks (145-hp Ranger engine) as the UC-61E; two Model 24R-9s (165-hp Ranger engine) as the UC-61F; two Model 24W-40s (145-hp Warner engine) as the UC-61G; one Model 24H (150-hp Ranger engine) as the UC-61H; one Model 24-C8F (145-hp Ranger engine) as the UC-61J; and nine Model 24R-20s (175-hp Ranger engine) as the UC-86. (Note: three aircraft impressed as the UC-61D were actually Fairchild Model 51As, reported under C-8, above.)

While a Majority of the 976 Model 24s produced under AAF serials between 1942 and 1944 went directly to Britain or Commonwealth Nations under Lend-Lease as the *Argus I, II, and III*, 146 entered AAF service in two variants: 43 as the UC-61 and 102 as the UC-61A with a 24-volt electrical system. During World War II, UC-61s served mainly as staff and utility transports and were all sold surplus soon after hostilities ended.

*Naval Variants:* The Coast Guard acquired two Model 24-C8Fs in 1936 as the J2K-1 and two Model 24Hs in 1937 as the J2K-2. All four were lost in crashes prior to World War II. In 1941 BuAer gave Fairchild a contract for 13 Model 24W-40s which were placed on the Navy inventory during 1942 as the GK-1. They were declared surplus shortly after the war ended.

## Waco C-62 (canceled)

## C-63 (provisional re-designation of Lockheed A-29A, not used)

## Noorduyn C/UC-64 (JA-1)—1941

Technical Specifications (UC-64A)

Type: Utility transport.

Manufacturer: Noorduyn Aviation Ltd., Montreal, Quebec, Canada.

Total military versions: 769 (765 AAF/USAF; 4 USN)

Capacity: One pilot plus 10 passengers or 1,500 lbs. of cargo.

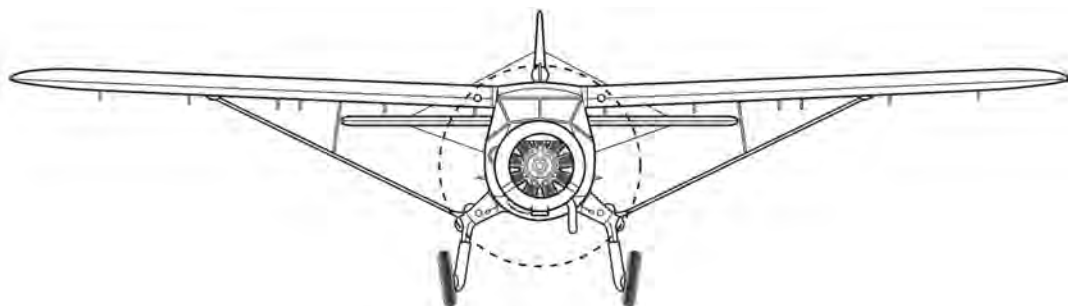
Powerplant: One 600-hp Pratt & Whitney R-1340-AN1 *Wasp* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 162-mph, cruise 148-mph; ceiling 17,000 ft.; range 475 mi.

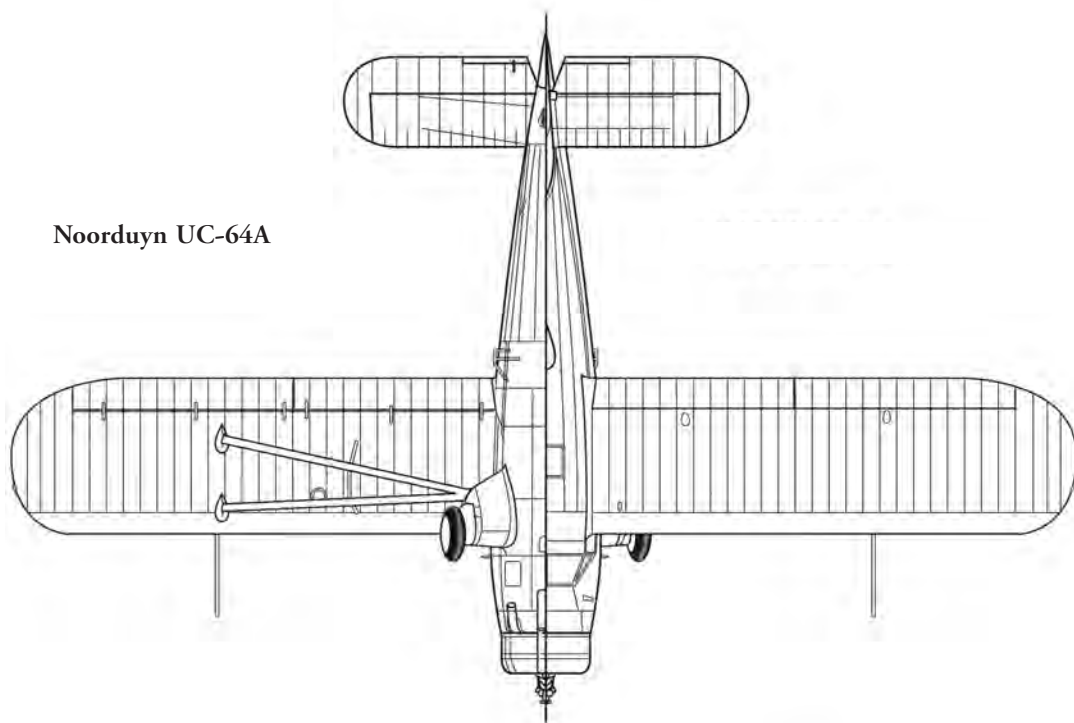
Weights: 4,680 lbs. empty, 7,400 lbs. loaded, 7,540 lbs. max. takeoff.

Dimensions: Span 51 ft. 6 in., length 31 ft. 9 in., wing area 296.3 sq. ft.

Designed by Robert Noorduyn to operate on wheels, skis, or floats from the harsh conditions of the Canadian bush, the “Norseman” flew for the first time in late 1935. A series of engine upgrades and other improvements led to new versions, the Norseman Mk. II, Mk. III, and Mk. IV, the latter becoming the definitive production model. However, just 17 aircraft had been sold by 1940 when Noorduyn received an RCAF order to produce 38 Norseman IVs as navigation trainers. In late 1941, for the purpose of surveying routes between Newfoundland and Greenland, the AAF acquired six Mk. IVs from the RCAF order that were placed in service as the YC-64. Between 1942 and 1944 under military contracts, a further 755 aircraft were delivered to the AAF, 749 as the UC-64A with extra fuel capacity, plus six equipped with floats as the UC-64B to be used by the Army Corps of Engineers for survey work. During World War II, UC-64s saw wide use as utility transports in various combat theaters as well as being operated as bush planes in Alaska, the Aleutians, Canada, and Greenland. Postwar, the USAF retained at least one UC-64A for Antarctic exploration until it was retired in the late 1940s.



Noorduyn UC-64A



*Naval Variants:* Four ex-AAF UC-64As were transferred to the Navy during World War II, one as the XJA-1 and three as the JA-1. After the war, one JA-1 was used in the Navy's Antarctic operation "High Jump" but lost after being abandoned on the Ross Ice Shelf during 1948.



Originally designed to be operated in the Canadian bush, this AAF UC-64A is seen rigged with skis, most likely in the Aleutian Islands.

### General Motors (Stout) C-65 and C-107 —1942

Technical Specifications (XC-65 Skycar II)

Type: Experimental transport.

Manufacturer: Fisher Body Div., General Motors Corp., Detroit, Michigan.

Total military versions: 2 (AAF).

Capacity: One pilot plus one passenger.

Powerplant: One 90-hp Franklin 4AC O-199 4-cylinder air-cooled opposed engine driving a two-bladed fixed-pitch wooden propeller.

Performance: Max. speed 110-mph; ceiling (not reported); range (not reported).

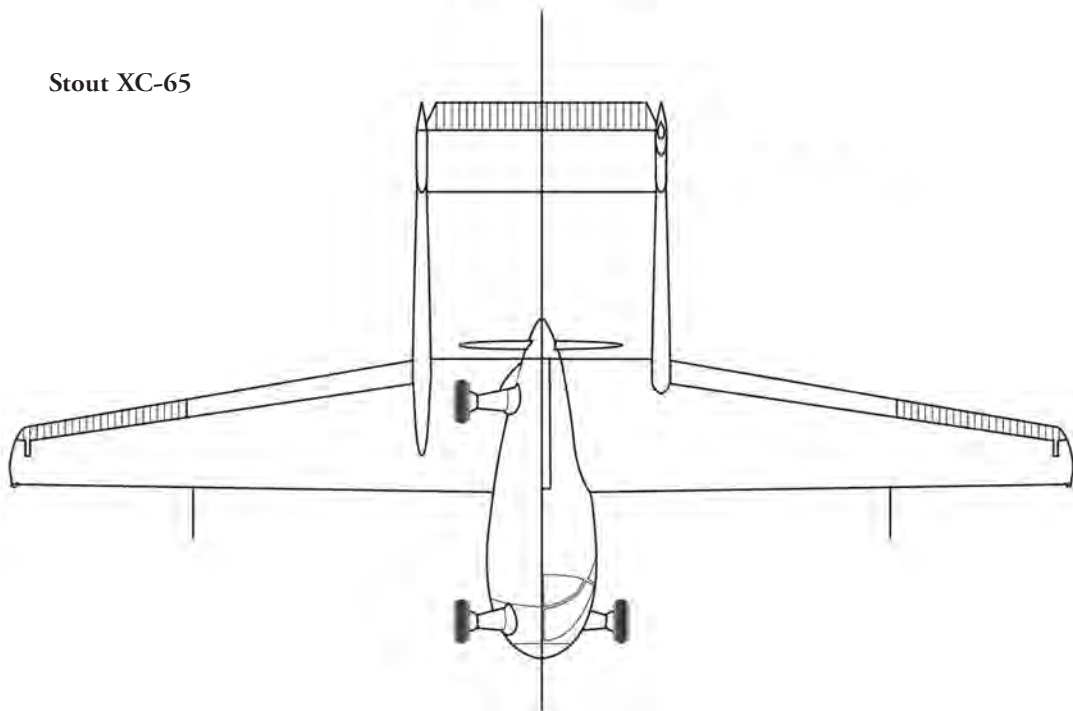
Weights: 900 lbs. empty (est.), 1,500 lbs. loaded.

Dimensions: Span 35 ft., length 20 ft. 5 in., wing area 175 sq. ft. (est.).

The XC-65 and XC-107 provide good examples of AAF Material Command's tendency to arbitrarily apply transport designations to miscellaneous aircraft that did not fit other categories. William B. Stout, designer of the Ford Trimotor, introduced the original Skycar in 1931 in an ultimately unsuccessful effort to produce an all-metal lightplane that duplicated the comfort of an automobile. A modernized Skycar II utilizing stainless steel construction was built by the Fisher Body Division of General Motors in 1941, then turned over to the AAF for evaluation purposes in 1942 as the XC-65. A year later, the AAF tested the very similar Skycar III, powered by a 125-hp Lycoming O-290, as the XC-107.



Stout XC-65





The XC-65 provides a good example of an aircraft being assigned a transport designation when it fit no other category. Tested to evaluate the use of stainless steel construction.

### Douglas UC-67 —1942

Technical Specifications (B-23)

Type: Passenger and cargo utility transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 18 (AAF).

Capacity: Crew of four plus 14 passengers or 7,441 lbs. of cargo.



After being withdrawn from bombardment units in 1942, 18 B-23s were disarmed and converted into UC-67 utility transports, like the example shown.

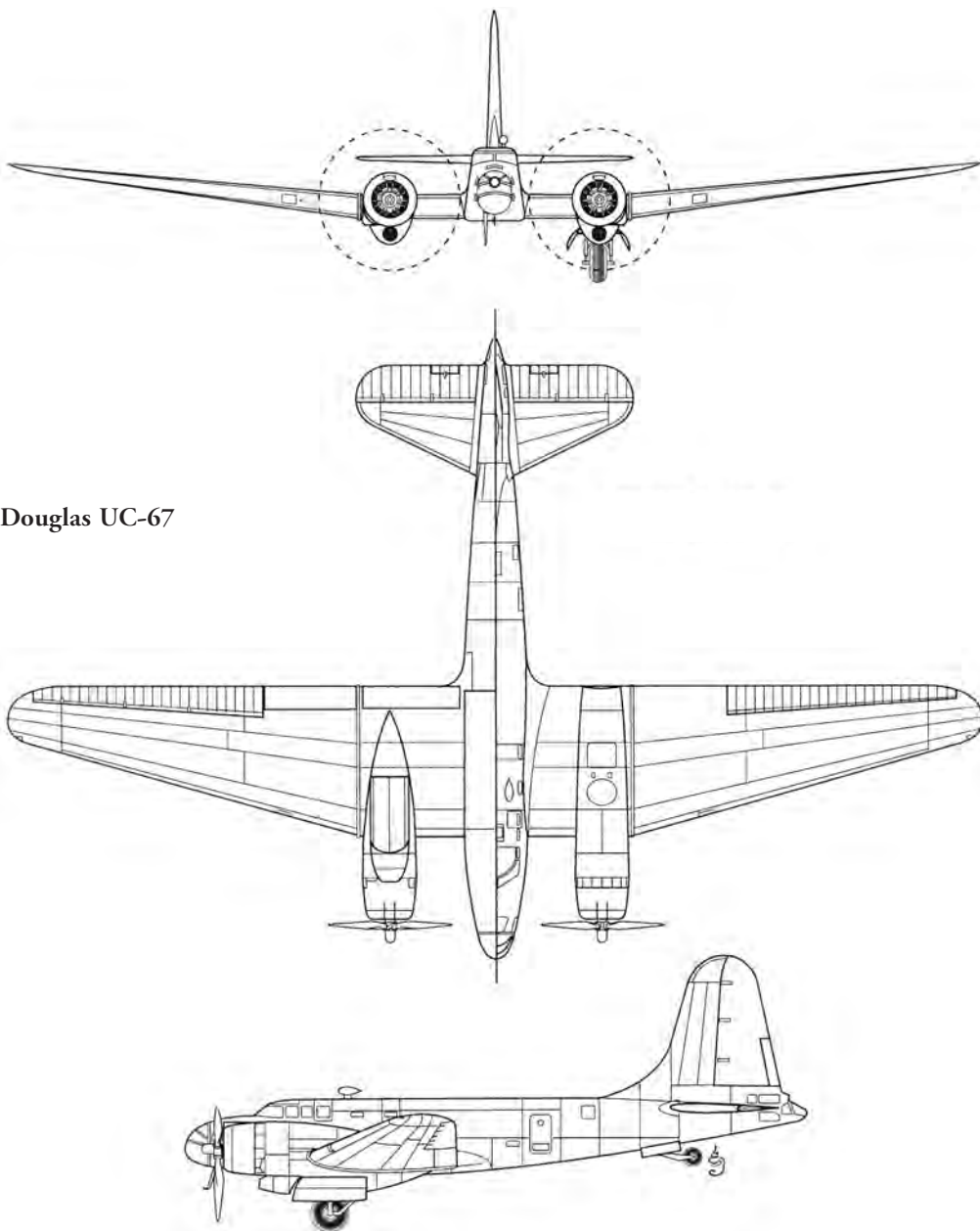
Powerplants: Two 1,600-hp Wright R-2600-3 *Twin Cyclone* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 282-mph, cruise 210-mph; ceiling 31,600 ft.; range 1,400 mi.

Weights: 19,059 lbs. empty, 26,500 lbs. loaded.

Dimensions: Span 92 ft. 6 in., length 58 ft. 4 in., wing area 993 sq. ft.

In 1938 the Air Corps amended its original B-18A contract to allow Douglas to complete the last 38 aircraft as the significantly redesigned B-23; however, when the prototype appeared in mid-1939, the Air Corps opted against quantity production of the B-23 in favor of the newer



Douglas UC-67



North American B-25 and Martin B-26. By the time the U.S. entered World War II, all B-23s had been relegated to non-combat duties, and after undergoing a conversion which entailed removal of all armament and fairing over the glazed nose and tail positions, 18 returned to AAF service as UC-67 utility transports. All UC-67s were sold surplus soon after the war ended.

## Lockheed C-69 and C-121 (R7V)—1943

Technical Specifications (C-121A [C-121C])

Type: Long-range logistics transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions: 117 (52 AAF/USAF; 65 USN), not including 208 variants completed as early warning and electronic platforms.

Capacity: Crew of five plus 43 [97] passengers or 20,076 lbs. [30,000 lbs.] of cargo.

Powerplants: Four 2,500-hp Wright R-3350-C18 [3,400-hp Wright R-3350-34] 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 358-mph [299-mph], cruise 327-mph [255-mph]; ceiling 25,000 ft. [24,400 feet]; range 4,150 [6,100] mi.

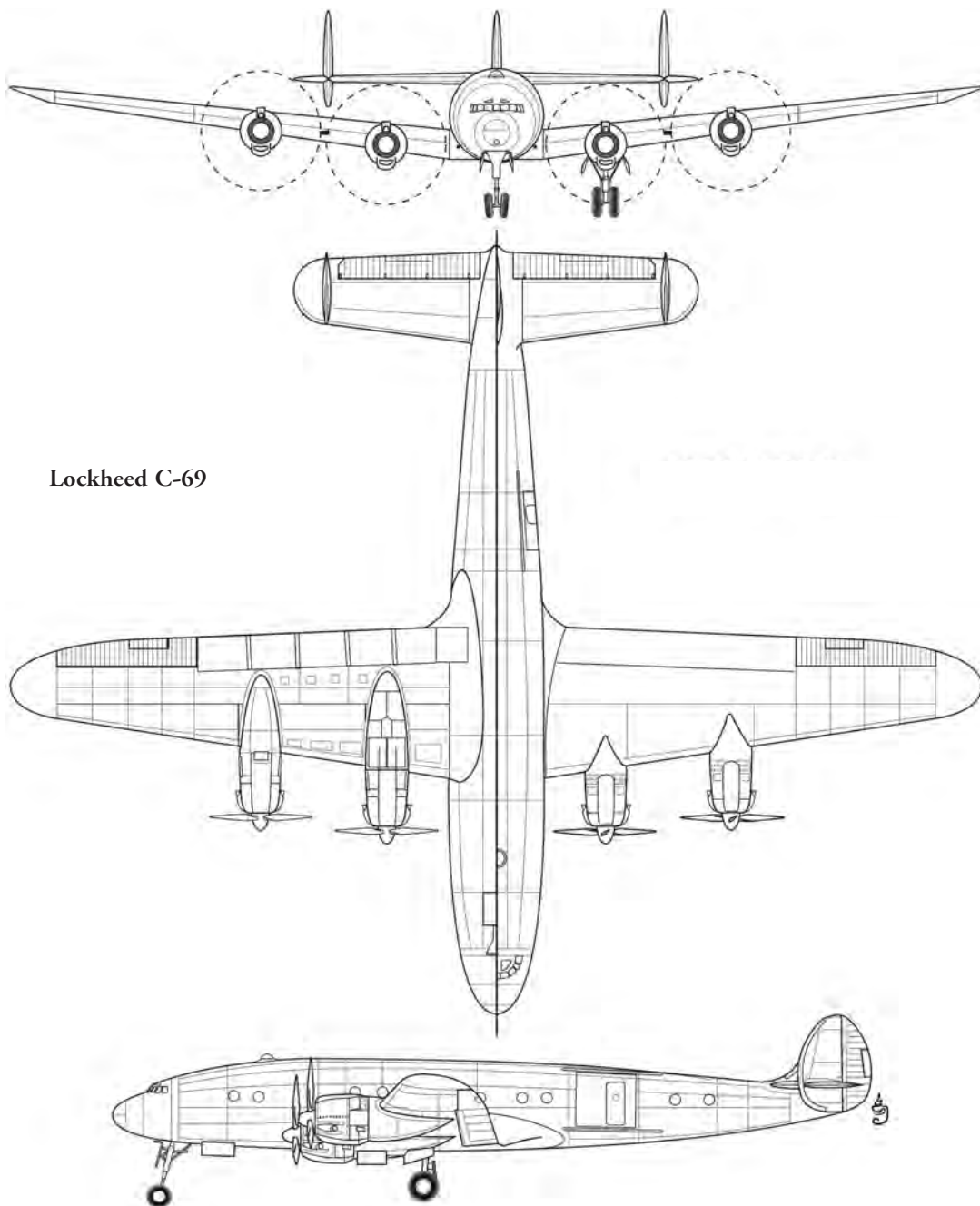
Weights: 58,970 lbs. [69,210 lbs.] empty, 107,000 lbs. [120,000 lbs.] loaded.

Dimensions: Span 123 ft., length 95 ft. 2 in [113 ft. 7 in.], wing area 1,650 sq. ft.

Work on the well-known Lockheed Constellation began in 1939 when Transcontinental and Western Airways (reportedly at the instigation of Howard Hughes) asked the company to create a pressurized, four-engine airliner capable of carrying 40 or more passengers over a distance of 3,500 miles. As the design of the Model L.049 proceeded, the engineering team of Kelly Johnson and Hall Hibbard conceived an elegantly curved, circular-section fuselage that produced an efficient aerodynamic shape and simultaneously lowered the nose and shortened the nosewheel strut. Wing layout and section was very similar to that of the P-38 fighter. The triple-fin empennage, the L.049's most striking characteristic, came from the need to provide adequate directional stability while keeping overall height low enough to allow the aircraft to fit within existing airline maintenance hangars. Other innovative features included hydraulically boosted controls and tricycle landing gear. After Lockheed issued estimated performance projections in late 1939, TWA responded with an initial order for nine L.049s, and by the end of 1940, total orders had risen to 84 aircraft. Lockheed had originally planned to build two prototypes, the first powered by 2,200-hp R-3350 *Double Cyclones* and the second by 2,000-hp R-2800 *Double Wasps*. But World War II intervened before the first prototype could be completed, and in September 1942, after the government had assumed control of all aircraft production, Lockheed was directed to deliver the first 22 L.049s on TWA's order to the AAF under the designation C-69.

The maiden flight of the first C-69 took place on January 9, 1943 from Lockheed's Burbank plant, with the aircraft being ferried to Muroc AAB the same day for military trials. After official AAF acceptance in mid-1943, the aircraft returned to Lockheed for further testing where it was subsequently converted to four 2,100-hp R-2800-83 engines as the XC-69E. A series of AAF contracts ultimately increased the number of C-69s on order to 313 aircraft in four versions: C-69A 100-seat troop transport; C-69B long-range troop transport; C-69C VIP transport; and C-69D with a thermal de-icing system. However, only eight aircraft (in addition to the prototype) had been delivered by the time the war ended, seven C-69s and one C-69C, and the balance of the contract was canceled. All but four were sold to airlines in 1946, with those retained in USAF service being re-designated in 1948, three as the ZC-69 and one as the ZC-69C.

In February 1948, following introduction of the more powerful and longer-range Model L.749 Constellation into airline service, the USAF ordered ten examples with reinforced floors and left-side cargo doors as the C-121A. Eight were delivered to MATS and two converted as



Lockheed C-69

VC-121A VIP transports, one as the *Columbine* for use of President-elect Eisenhower in 1952 and the other as *Bataan* for Gen. Douglas MacArthur. The tenth aircraft, completed to a 24-seat/14-sleeper VIP configuration as the VC-121B became the *Columbine II* presidential aircraft.

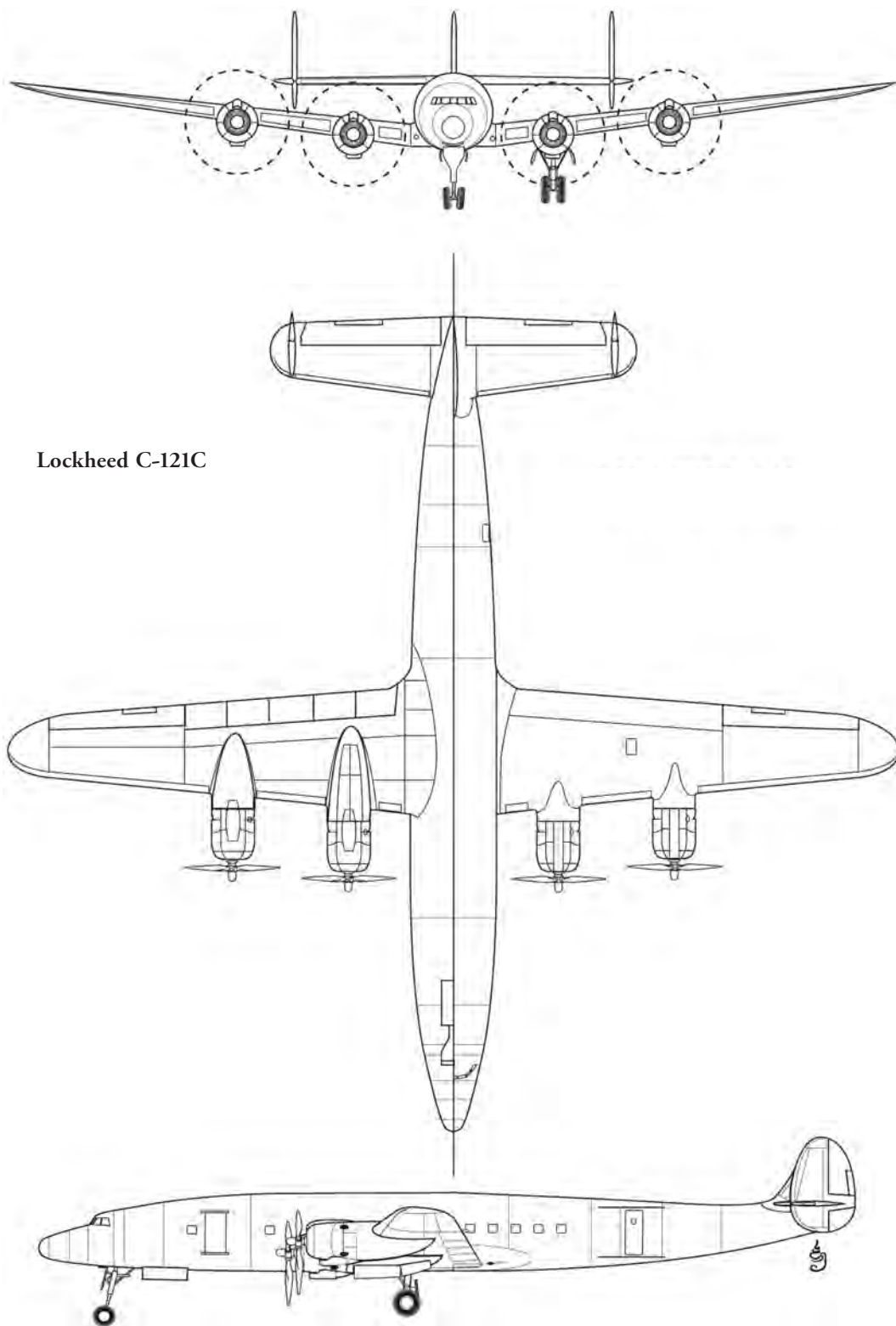
The Model L.1049 Super Constellation, featuring an eighteen-foot five-inch fuselage stretch and significantly increased range, made its airline debut in late 1950. The USAF responded with an order for 33 cargo-configured aircraft as the C-121C with deliveries to MATS starting in



The first C-69 seen leaving the runway in early 1943. The aircraft, still in civil registry, was not accepted by the AAF until the following July. Government orders for over 300 were canceled when the war ended.



One of eight C-121As that entered MATS service in 1948 and 1949. Based on the L.749 airliner, military variants came with reinforced floors and left-side cargo doors.



Lockheed C-121C



**MATS C-121C operating with the Atlantic Division in the late 1950s. Nose radar was a retrofit. MATS began phasing out its C-121Cs the early 1960s, but the final examples did not leave ANG service until 1973.**

1952. In later service, a number of C-121Cs were converted to other uses: four with VIP interiors as the VC-121C; two with electronics testing equipment as the JC-121C; and four with electronic countermeasures equipment as the EC-121C. One Model L.1049, originally ordered by the Navy as an R7V-1, was converted to a presidential aircraft during assembly as the VC-121E and served as the *Columbine III* from 1954 to 1962. During the late 1950s, 33 ex-Navy R7V-1s were turned over to the USAF for use in MATS as the C-121G. Through the course of their operational career with MATS, USAF C-121s, along with Navy R7Vs, participated in a number of major airlift efforts that included the Korean War (1950–1953), Suez War and Lebanon Crisis (1956–1958), Congo Airlift (1960–1963), Berlin Crisis (1961), Cuban Missile Crisis (1962), and the Vietnam War (1964–1965). The process of phasing-out USAF C-121As, Cs, andGs from MATS began in 1961, with the final examples being retired in 1966. Some ex-USAF C-121Gs were transferred to ANG units where they served until withdrawn in 1973.

*Naval Variants:* In 1951 the Navy ordered 65 Model L.1049B Super Constellations from Lockheed as the R7O-1, however, before deliveries commenced in late 1952, the contract was reduced to 51 aircraft with a designation change to R7V-1. R7V-1s came with reinforced floors and left-side cargo doors but differed from C-121As in having circular side windows and 3,250-hp R-3350-91 engines. During construction, two R7V-1s modified to accept installation of four 5,550-shp Pratt & Whitney YT-34-P-12A turboprop engines were test flown in late 1954, then delivered to the Navy in 1955 as the R7V-2. After being re-engined with 6,000-shp T-34-P-6 engines, these two aircraft were transferred to the USAF as the YC-121F and operated experimentally with the Services Test Squadron. Thirty-two Navy R7V-1s were transferred to the USAF in the late 1960s as the C-121G. One R7V-1 equipped with cameras to serve with VX-6 in the Antarctic was re-designated R7V-1P in 1962. When the tri-service designation system was adopted in late 1962, remaining R7V-1s became the C-121J, the last example being withdrawn from service in 1967.



**UC-70 (see Howard GH/NH in Part B)****Spartan UC-71—1942**

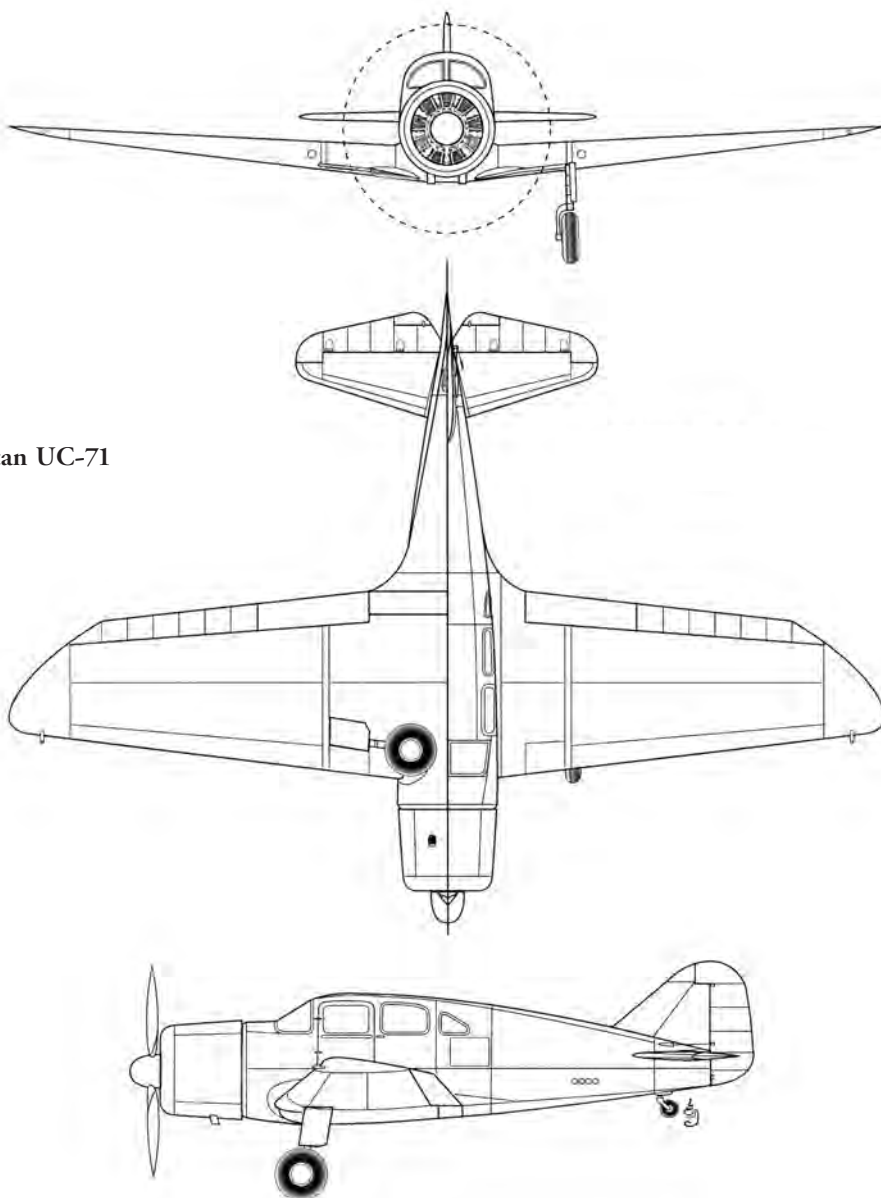
Technical Specifications (UC-71)

Type: Staff transport.

Manufacturer: Spartan Aircraft Co., Tulsa, Oklahoma.

Total military versions: 16 (AAF).

Capacity: One pilot plus four passengers.



**Spartan UC-71**





**Very rare picture of a Spartan UC-71 seen in AAF camouflage and markings during World War II. The all-metal 7W Executive represented the state of the art when introduced in 1936.**

Powerplant: One 400-hp Pratt & Whitney R-985-SB13 *Wasp Junior* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 212-mph, cruise 190-mph; ceiling 24,000 ft.; range 900 mi.

Weights: 4,680 lbs. empty, 7,400 lbs. loaded, 7,540 lbs. max. takeoff.

Dimensions: Span 39 ft., length 26 ft. 10 in., wing area 250 sq. ft.

The Model 7W “Executive,” brainchild of Spartan’s founder, oil magnate William G. Skelly, appeared in early 1936 as one of the most modern single-engine civil aircraft of its day. In addition to being a very streamlined, all-metal monoplane, it introduced such trend-setting features as deeply cushioned seats, extensive sound-proofing, large windows, and a cabin heating and ventilation system. In 1942 the AAF impressed 11 civil Model 7Ws plus another five off Spartan’s production line as the UC-71. After being used in the continental U.S. as fast staff transports, the 14 UC-71s remaining at the war’s end were either returned to their original owners or sold surplus.

## Waco UC-72 (J2W)—1936

Technical Specifications (SRE/UC-72)

Type: Staff and passenger utility transport.

Manufacturer: Waco Aircraft Co., Troy, Ohio.

Total produced: 48 (45 AAF; 3 USCG).

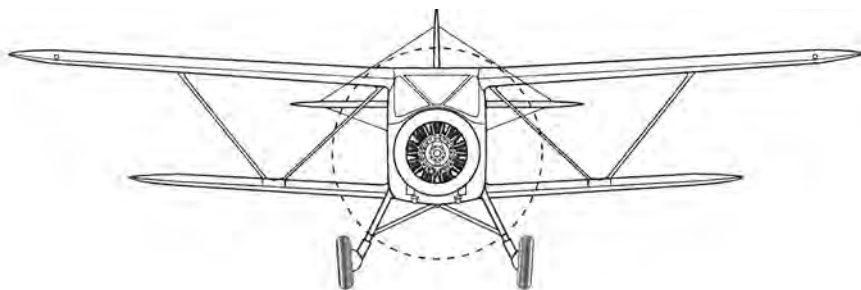
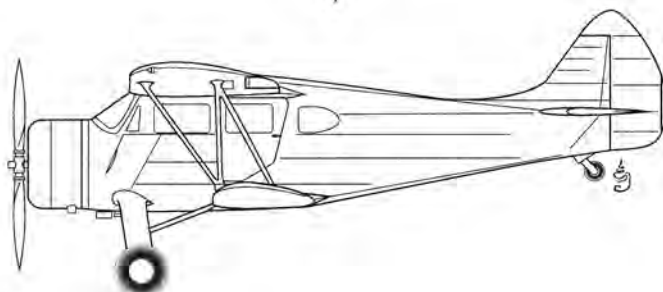
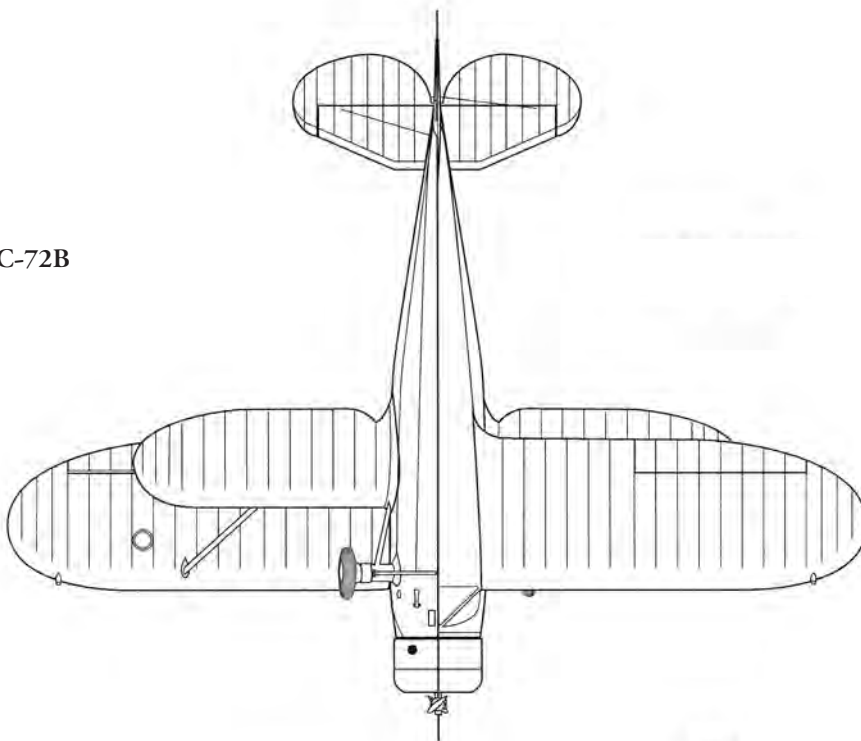
Capacity: One pilot plus four passengers or 800 lbs. of cargo.

Powerplant: One 450-hp Pratt & Whitney R-985-33 *Wasp Junior* 9-cylinder air-cooled radial engine driving a Hamilton Standard two-bladed, variable-pitch metal propeller.

Performance: Max. speed 202-mph, cruise 195-mph; ceiling 23,500 ft.; range 1,070 mi.

Weights: 2,734 lbs. empty, 4,000 lbs. loaded.

Dimensions: Span 34 ft. 9 in., length 27 ft. 10 in., wing area 285.2 sq. ft.

**Waco UC-72B**

After the U.S. entered World War II, the AAF impressed 45 civil cabin Wacos of various types as the UC-72 under a variety of suffixes. Cabin Wacos, starting with the Model QDC (165-hp Continental A70 engine) in 1931, became one of the most popular American-made civil aircraft of the 1930s. Cabin Wacos were fabric-covered biplanes, typically constructed with steel tube fuselage frames and built-up wooden wings. Waco identified its aircraft with a three-letter code sequenced in order of powerplant, airframe type, and production series, and in some cases,



Fastest of the cabin Waco biplane series, this UC-72 was one of 12 civil model SREs impressed into AAF service in 1942. Altogether, the AAF conscripted 48 cabin Wacos in 16 sub-variants.



The three Waco EQC-6s purchased by the Coast Guard in 1936 as the J2W-1 saw a variety of duties, including operations in Alaska on floats and ski. All three were destroyed in accidents during 1939.

ending in a dash-number to indicate year of manufacture (e.g., -8 = 1938). Thus, with the Model SRE mentioned above: S = Pratt & Whitney R-985 engine; R = 1939 Custom Cabin Type; and E = Executive Series. Cabin Wacos taken into AAF service from 1942 onwards received the following designations: 12 Model SREs (420–450-hp Pratt & Whitney R-985 engine) as the UC-72; four Model AREs (300-hp Jacobs L-6 engine) as the UC-72A; one Model EGC-8 (320-hp Wright R-760 engine) as the UC-72B; two Model HREs (285-hp Lycoming R-680 engine) as the UC-72C; two Model VKS-7s (240-hp Continental R-670 engine) as the UC-72D; four Model ZGC-7s (285-hp Jacobs L-5 engine) as the UC-72E; one Model CUC-1 (250-hp Wright R-760 engine, actually built in 1935) as the UC-72F; one Model AQC-6 (300-hp Jacobs L-6 engine) as the UC-72G; six Model ZQC-6s (285-hp Jacobs L-5 engine) as the UC-72H; four tri-gear Model AVN-8s (300-hp Jacobs L-6 engine) as the UC-72J; one Model YKS-7 (225-hp Jacobs L-4 engine) as the UC-72K; one tri-gear Model ZVN-8 (285-hp Jacobs L-5 engine) as the UC-72L; two Model ZKS-7s (285-hp Jacobs L-5 engine) as the UC-72M; one Model YOC-1 (225-hp Jacobs L-4 engine, built in 1935) as the UC-72N; two Model AGC-8s (300-hp Jacobs L-6 engine) as the UC-72P; and one ZQC-6 (285-hp Jacobs L-5 engine) as the UC-72Q. Once the war ended, all UC-72 variants were returned to their owners or sold.

*Naval Variants:* In 1936 the Coast Guard acquired three Waco EQC-6s (320-hp Wright R-760 engine) under the designation J2W-1. The J2W-1s were initially employed for a variety of duties and one (V159) was variously rigged with floats and skis for operations out of Cordova, Alaska. After being assigned to the Air Patrol Detachment in El Paso, Texas, all three aircraft were lost in crashes during 1939.

## Boeing C-73 — 1942

Technical Specifications (C-73)

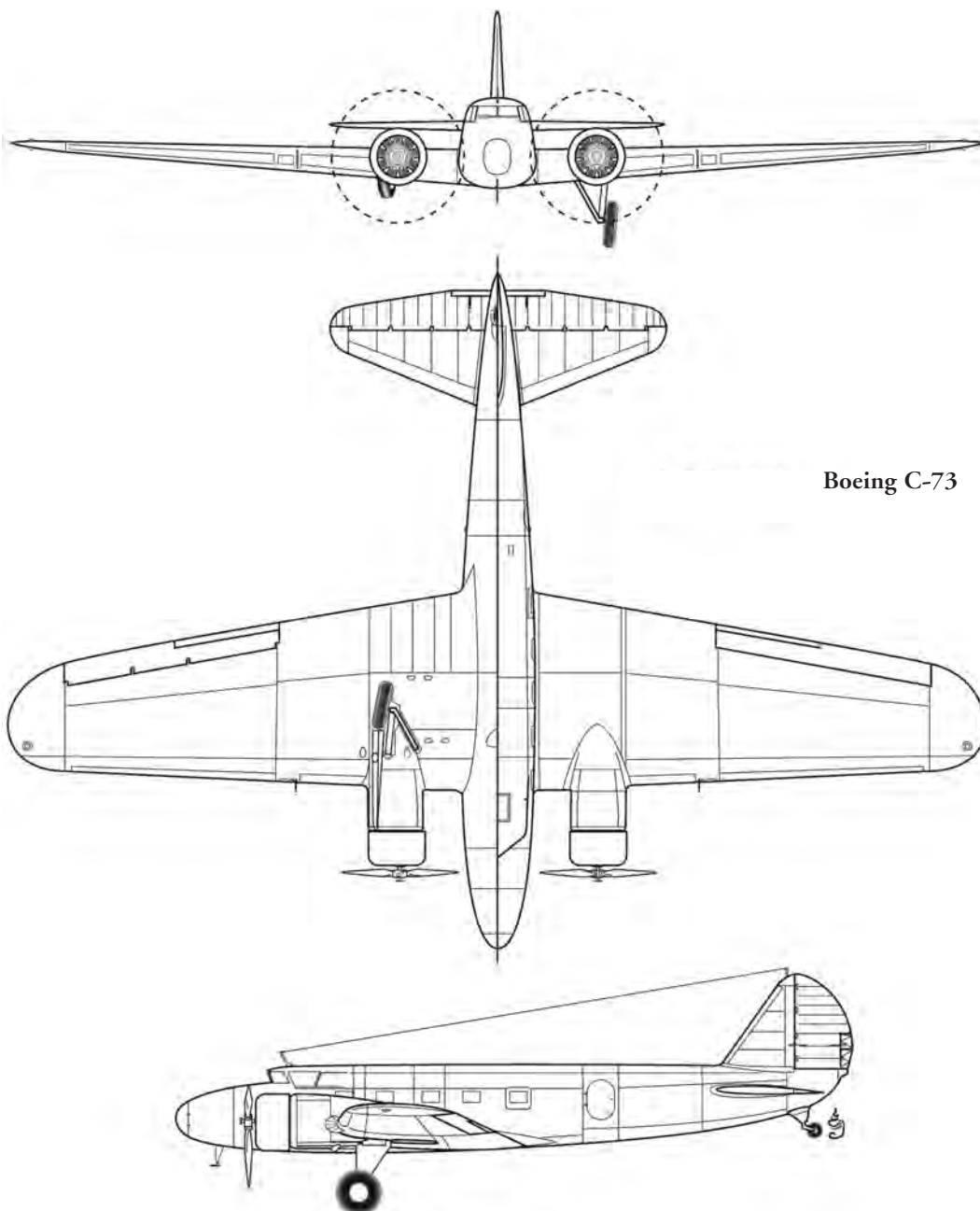
Type: Passenger and cargo transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 27 (AAF).



The AAF impressed 27 Boeing 247s and 247Ds during the war, most from United Air Lines. The C-73 depicted is an older 247 that has been upgraded to R-1340-AN1 engines with full-chord cowlings.

**Boeing C-73**

Capacity: Crew of three plus ten passengers or 2,000 lbs. of cargo.

Powerplants: Two 600-hp Pratt & Whitney R-1340-AN1 *Wasp* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard variable-pitch metal propellers.

Performance: Max. speed 200-mph, cruise 189-mph; ceiling 25,400 ft.; range 745 mi.

Weights: 9,921 lbs. empty, 13,650 lbs. loaded, 16,805 lbs. max. takeoff.

Dimensions: Span 74 ft. 1 in., length 51 ft. 5 in., wing area 836.4 sq. ft.

Though rapidly overtaken in the U.S. airline market by the Douglas DC-2 and DC-3, the Boeing Model 247 still deserves recognition as having been the most advanced passenger-carrying



aircraft in the world at the time it flew in February 1933. Besides its modern aerodynamic design, innovations such as all-aluminum, semi-monocoque construction, fully cantilevered wings, and retractable landing gear established a new standard for all commercial aircraft that followed it. Of 75 247s and 247Ds built, the AAF impressed 27 (most from United Airlines) in 1942 under the designation C-73. The designation makes no apparent distinction between the earlier Model 247, recognizable by a forward-swept windscreen and ring cowls, and the 247D, which differed in having a swept-back windscreen, NACA cowls, and geared engines driving three-bladed, variable pitch propellers. During their wartime service, many of the older C-73s were re-powered with 600-hp R-1340-AN1 engines. Most had been returned to the airlines even before the war ended.

## Douglas C-74—1945

Technical Specifications (C-74)

Type: Long-range strategic airlift transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 14 (AAF/USAF).

Capacity: Crew of five plus 125 troops or 48,150 lbs. of cargo.

Powerplants: Four 3,000-hp Pratt & Whitney R-4360-27 *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Curtiss electric fully reversible metal propellers.

Performance: Max. speed 312-mph, cruise 260-mph; ceiling 25,000 ft.; range 7,200 mi.

Weights: 86,170 lbs. empty, 154,128 lbs. loaded, 165,000 lbs. max. takeoff.

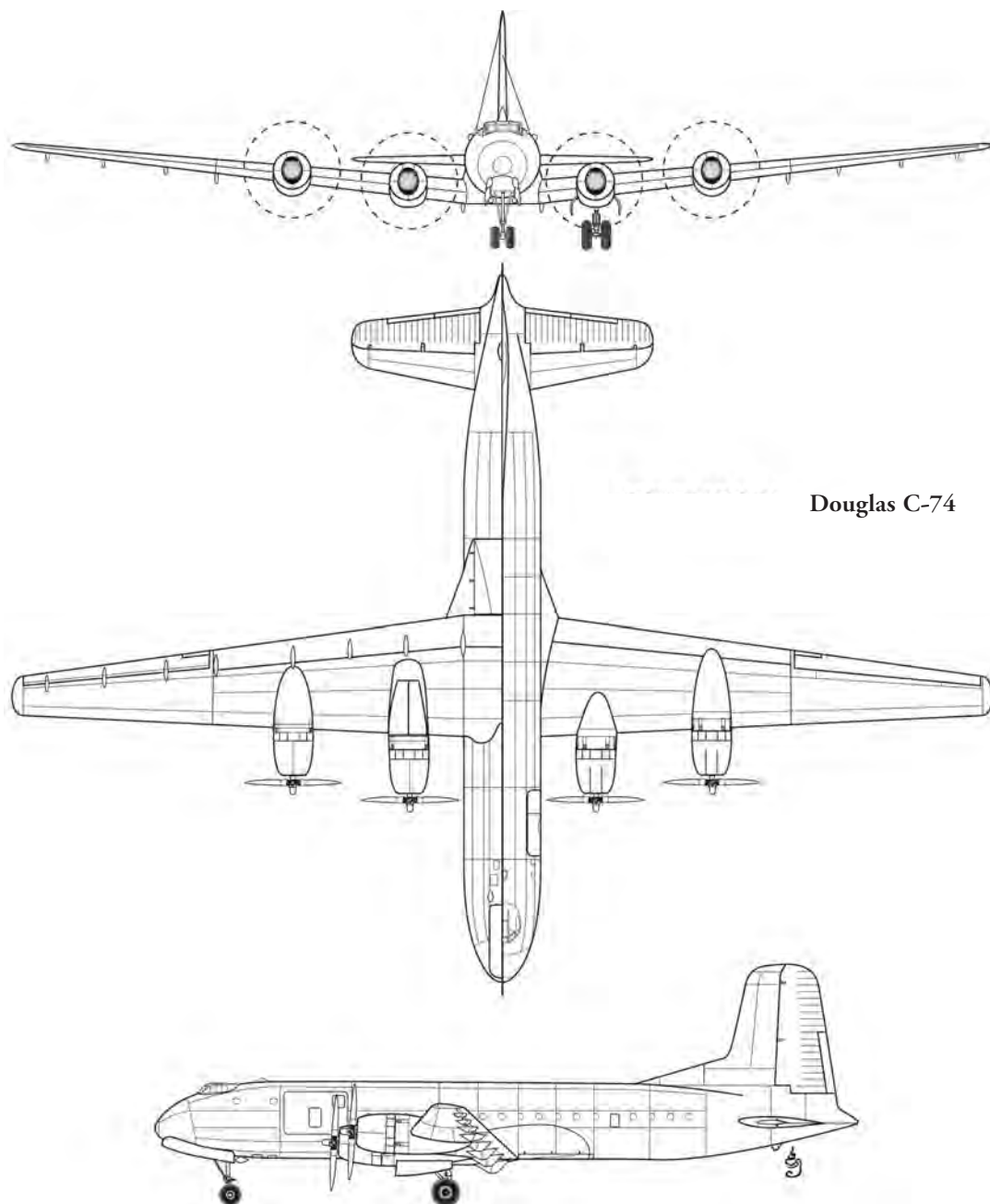
Dimensions: Span 173 ft. 3 in., length 124 ft. 2 in., wing area 2,510 sq. ft.

When it left the runway for the first time, the Douglas C-74 “Globemaster” was the largest landplane transport to have ever flown and the largest aircraft of any type to have been placed in production. Its origins can be traced to early 1942 when the War Department asked Douglas to conceive a transport with the speed and range of a C-54 but carry more than twice its load. Not surprisingly, Douglas emerged with a blueprint that represented a fairly straightforward enlargement of the C-54 in terms of aerodynamic shape and airframe structure. Since the C-74 was never intended to be an airliner, pressurization was not required, and the interior layout was planned from the outset to accommodate military vehicles, artillery pieces, and up to 125 fully equipped troops. A conventional four-engine arrangement was made practical by the increased horsepower available from newly developed powerplants like the four-row R-4360. Cockpit layout was unorthodox, pilot and co-pilot being stationed under separate bubble canopies which gave the aircraft a decided “bug-eye” appearance from the front.

The initial contract given to Douglas in mid-1942 contemplated delivery of at least 50 production C-74s (no experimental prototypes) plus one static test example; however, as a result extended development, the first flight did not take place until September 5, 1945, and the contract was canceled after V-J day when only 14 aircraft had been completed. The second C-74 was destroyed during testing in August 1946, the fourth became the static test example, and the fifth held back at Douglas for what ultimately became the YC-124. The other 11 C-74s entered service with ATC during 1946, being absorbed into the USAF in 1947 and into MATS in 1948. In the course of their service careers, C-74s received an upgrade to 3,250-hp R-4360-49 engines and were retrofitted with conventional, side-by-side cockpits after the two canopy layout proved to be very unpopular with aircrews.

In MATS service, all C-74s were assigned to the Atlantic Division, operating out of Brookley AFB in Mobile, Alabama where they provided long-haul logistical support for Strategic Air Command (SAC) and Tactical Air Command (TAC) operations in Europe, Africa, the Middle





Douglas C-74

East, and the Caribbean. During the Berlin Airlift (1948–1949), C-74s played a key role transporting engines and parts to West Germany for the C-54s operating in and out of Berlin. For the first two years of the Korean War (1950–1951), C-74s were used primarily to move cargo and wounded military personnel between Hickam AFB, Hawaii and the continental U.S., however, due to lack of spare parts and associated maintenance delays, operations became so impractical that, in November 1952, all 11 C-74s were placed in flyable storage at Brookley. In early 1956, they were officially removed from the active USAF inventory and placed in storage at



When the war ended, the contract was reduced to only the 14 C-74s completed. All of them served with the Atlantic Division of MATS to provide logistical support to SAC and TAC bases overseas.

Davis-Monthan AFB in Arizona. Four C-74s were later sold surplus to civilian owners, with the remaining seven being scrapped in 1965.

## Boeing C-75 — 1942

### Technical Specifications (C-75)

Type: Long-range passenger and cargo transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 5 (AAF).

Capacity: Crew of five plus 38 passengers or 15,000 lbs. of cargo.

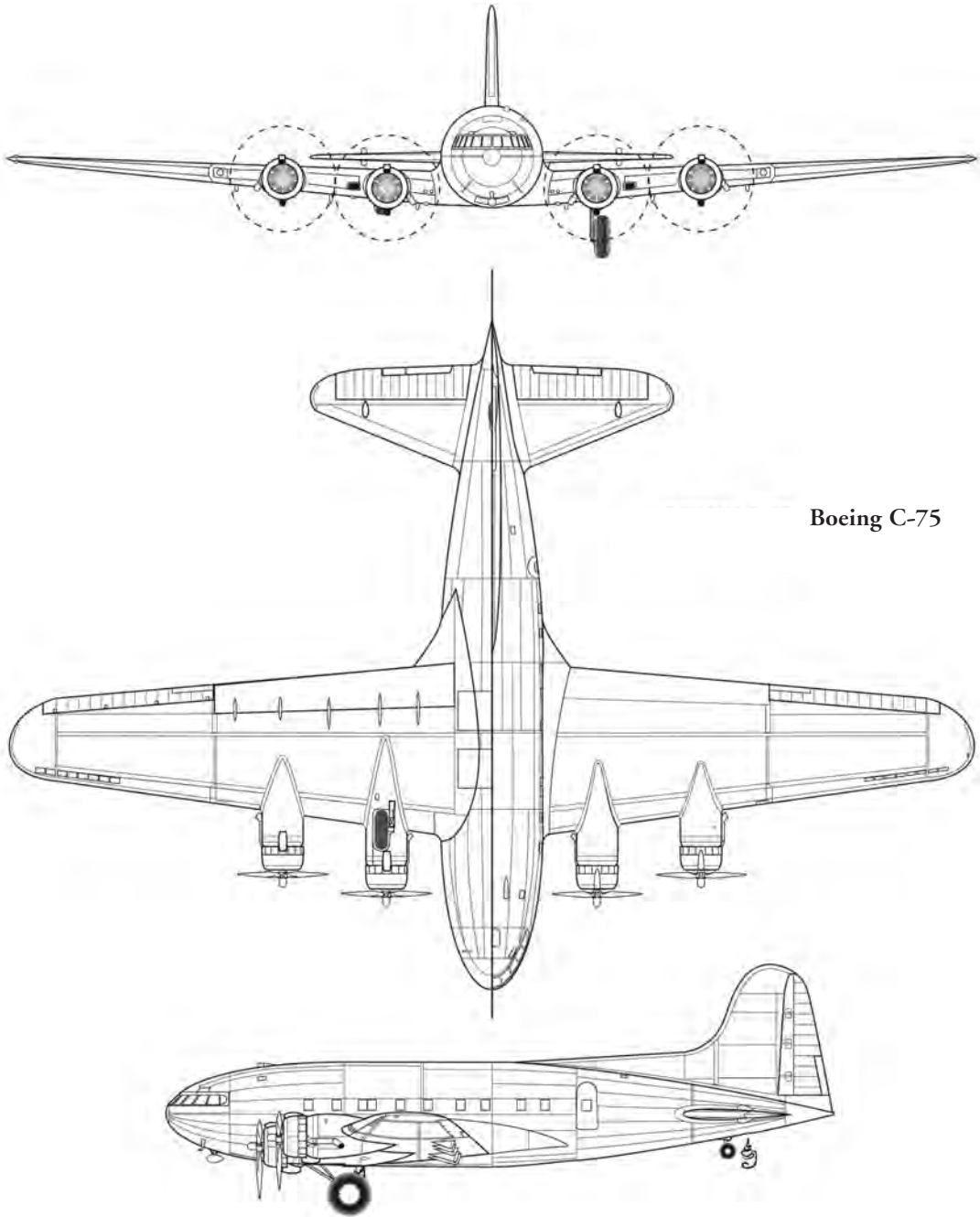
Powerplants: Four 1,100-hp Wright R-1820-G102 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard hydromatic metal propellers.

Performance: Max. speed 241-mph, cruise 215-mph; ceiling 23,300 ft.; range 1,750 mi.

Weights: 30,000 lbs. empty, 45,000 lbs. loaded.

Dimensions: Span 107 ft., length 74 ft. 4 in., wing area 1,486 sq. ft.

The Boeing Model 307 “Stratoliner” was the first commercial aircraft to offer a pressurized cabin and the first land-based airliner to include a flight engineer. Boeing arrived at the design by combining the wings, engine nacelles, tail group, and landing gear of a B-17C bomber with a new, circular-section fuselage optimized for pressurization. After releasing performance estimates in 1937, Boeing received an initial order from Pan American Airways for four Model 307s, followed by one from Transcontinental and Western Airlines (TWA) for five. Construction of the first prototype continued through most of 1938, and under civil registration NX19901, its first flight took place on December 31. When testing revealed inadequate directional stability,

**Boeing C-75**

Boeing added a dorsal fillet and new vertical tail surfaces of increased area, a feature subsequently incorporated to the B-17E. In addition to the prototype, lost in a fatal crash in 1939, Boeing completed nine more Model 307s: one delivered in 1939 to millionaire Howard Hughes for a new around-the-world record attempt (ultimately prevented by the war in Europe), plus eight to airlines in 1940, three to Pan American and five to TWA, the latter group being Model 307Bs with uprated R-1820-G102 engines.



**The five model 307B Stratoliners impressed from TWA as the C-75 flew transatlantic routes under ATC control until April 1945. Photograph shows “Cherokee” being loaded for an overseas flight.**

In late December 1941, following declaration of war, the five TWA 307Bs were impressed into AAF service under the designation C-75, though still flown by TWA aircrews. Under ATC control, the C-75s operated primarily on two routes, from Washington, D.C., to Cairo, Egypt, with intermediate stops in Natal, Brazil and Accra, Ghana, and from New York City to Prestwick, Scotland, with an intermediate stop in Gander, Newfoundland. As C-54s took over the New York–Prestwick route, the C-75s began flying between Scotland and Marrakesh, Morocco. All five C-75s were returned to control of TWA in April 1945.

## **Curtiss C-76 —1943**

Technical Specifications (YC-76)

Type: Troop and cargo transport.

Manufacturer: Curtiss Airplane Div., Curtiss-Wright Corp., St. Louis, Missouri, and Louisville, Kentucky.

Total military versions: 14 (AAF).

Capacity: Crew of two plus 23 troops or 9,700 lbs. of cargo.

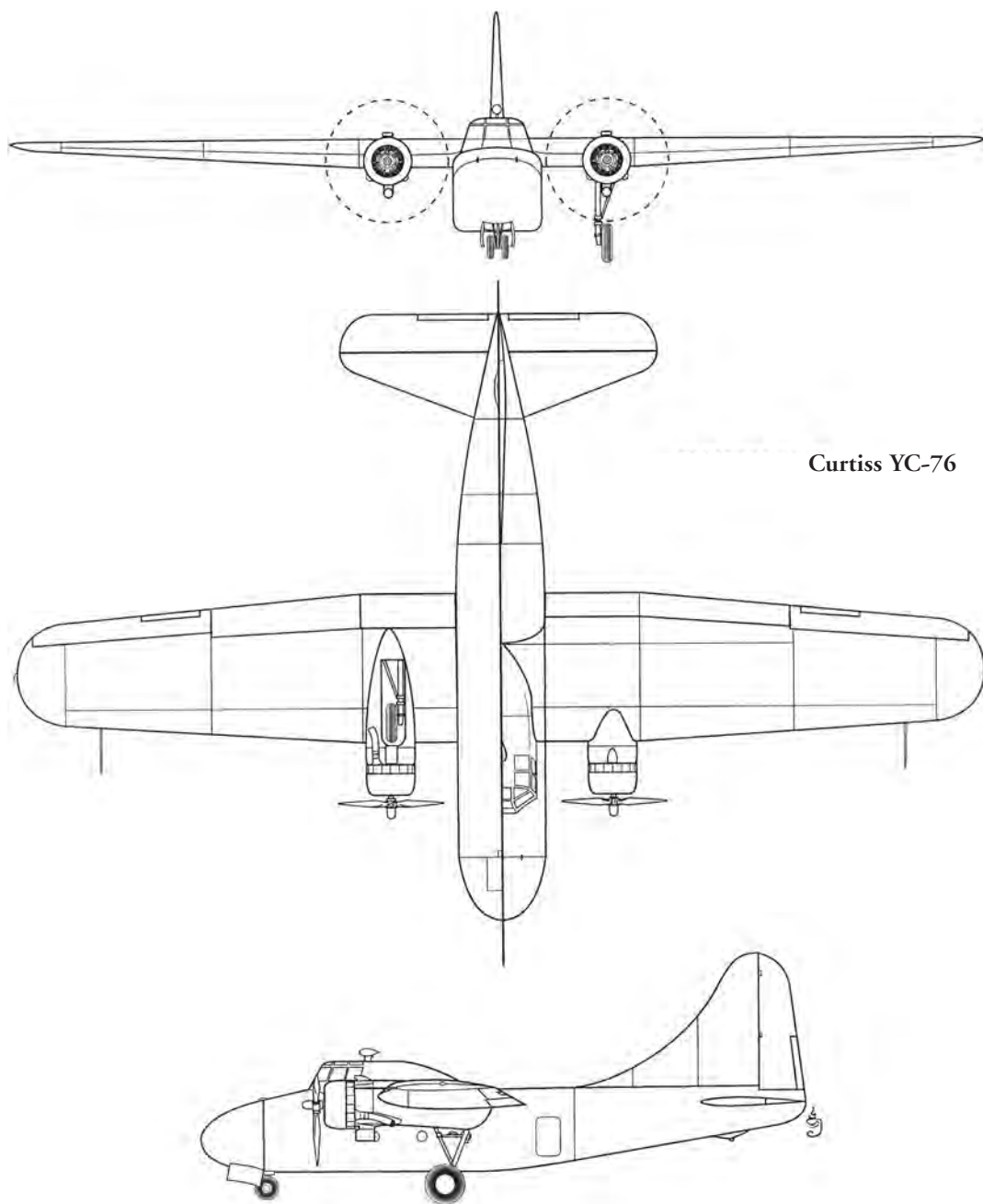
Powerplants: Two 1,200-hp Pratt & Whitney R-1830-92 *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 192-mph, cruise 160-mph; ceiling 22,600 ft.; range 750 mi.

Weights: 18,262 lbs. empty, 28,000 lbs. loaded.

Dimensions: Span 108 ft. 2 in., length 68 ft. 4 in., wing area 1,560 sq. ft.

The concept behind the Curtiss C-76 “Caravan” emerged from the need for a dedicated military transport that could be constructed from non-strategic materials, in this case, wood, in the event the United States experienced wartime shortages of light metal alloys. In addition to



the wood structure, detailed War Department requirements issued in 1941 contemplated a twin-engine military transport powered by Pratt & Whitney R-1830-92 engines that possessed a payload of 8,000 lbs. (comparable to a C-47) and could be end-loaded from a level position at average truck-bed height. The Curtiss proposal, submitted as the Model CW-27, materialized as a high-wing layout on tricycle landing gear in which the entire nose could be hinged to the right to allow loading and unloading. To maximize the interior volume of the boxy fuselage, the flight deck was located above the wing over the cargo bay. For reasons of structural strength,



**Despite substandard performance and poor flying characteristics, the YC-76 helped shape the pattern for future tactical transports. The metal shortage calling for all-wood construction never materialized.**

Curtiss selected a type of plywood composed of solid mahogany laminations rather than lighter material, a decision that ultimately proved to cause weight and balance problems in the completed aircraft.

The AAF ordered the CW-27 into production under the designation C-76, the initial contract calling for 11 YC-76 service test examples built at St. Louis, followed by large-scale production at a new plant to be established in Louisville, Kentucky. The prototype YC-76, named "Caravan" by the factory, made its first flight on January 1, 1943. Testing immediately revealed the aircraft to be seriously underpowered for its weight and due to center-of-gravity deviation, dynamically unstable when flown empty. In military acceptance trials during early 1943, AAF Material Command rated the YC-76's overall performance deficient in terms of payload, speed, ceiling, and range. And load tests conducted on the static example indicated structural weakness in the wings. By the time the War Department terminated the contract in August 1943, Curtiss had delivered all 11 YC-76s, two of which had been lost in crashes, and completed five C-76s at the Louisville plant. All YC-76s were subsequently grounded and four of the five C-76s made one-time flights to Air Training Command bases where they were used as instructional airframes.



## **Cessna UC-77 and UC-94 —1942**

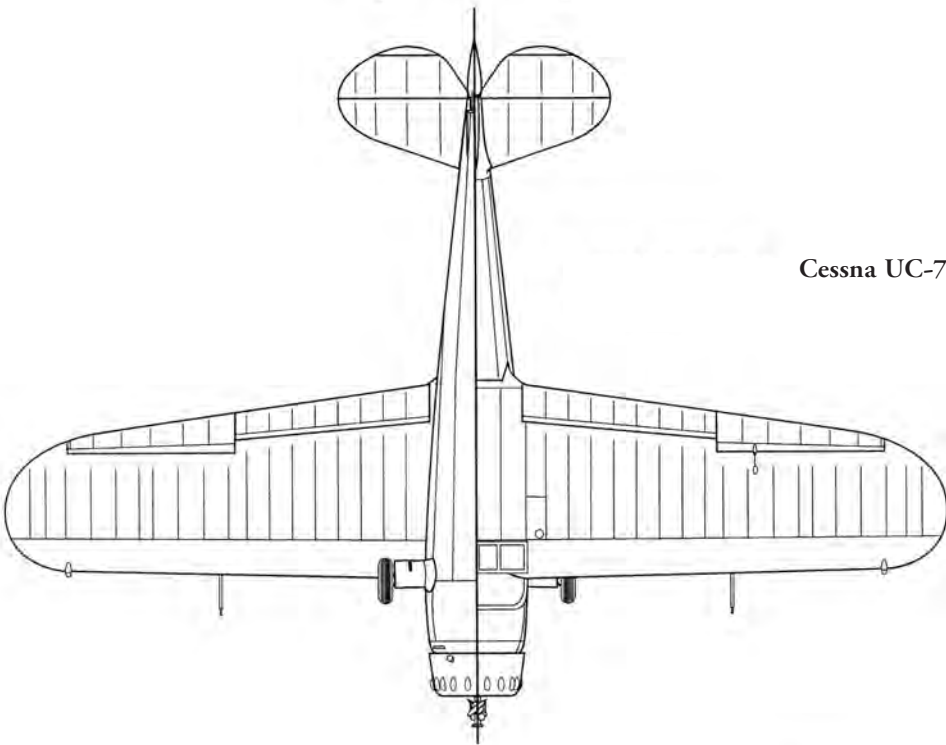
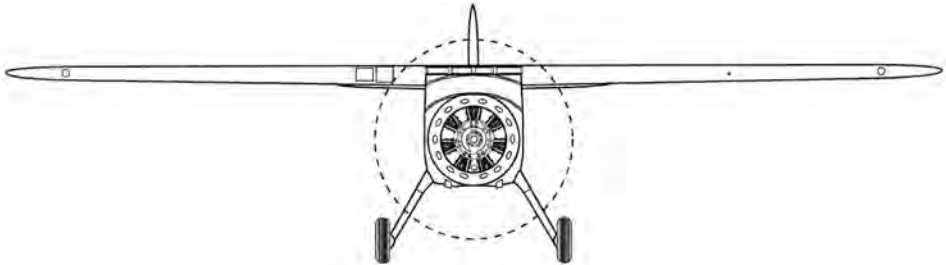
Technical Specifications (UC-94)

Type: Staff and passenger utility transport.

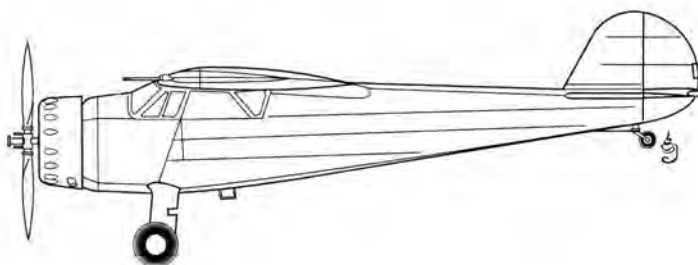
Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 10 (AAF).

Capacity: One pilot plus three passengers.



**Cessna UC-77B**





A civil Cessna model DC-6A, essentially identical to the four aircraft impressed into AAF service during 1942 as the UC-77.



A civil model C-165 Airmaster, essentially identical to the three aircraft impressed into AAF service as the UC-94.

Powerplant: One 165-hp Warner R-500 *Super Scarab* 7-cylinder air-cooled radial engine driving a two-bladed Curtiss-Reed fixed-pitch metal propeller.

Performance: Max. speed 165-mph, cruise 157-mph; ceiling 18,000 ft.; range 725 mi.

Weights: 1,380 lbs. empty, 2,350 lbs. loaded.

Dimensions: Span 34 ft. 2 in., length 25 ft., wing area (not reported).

Historical sources differ as to the exact numbers of and designations applied to certain single-engine Cessna aircraft impressed into AAF service during World War II. Two distinct Cessna models were incongruously designated as UC-77 variants: four Model DC-6As as the UC-77 and four DC-6Bs as the UC-77A; and two Model C-34s and one Model C-37 as the UC-77B and C, respectively. Adding to the confusion, three impressed Model C-165s were placed on the AAF inventory as the UC-94.

Cessna Models DC-6A and B (not to be confused with later “Douglas Commercial” transports), both built in 1929, were scaled-down, four-seat versions of the company’s high-wing monoplane CW series of 1928. The Model C-34, introduced in 1935, was followed in production by related Models C-37, C-38, C-145, and C-165, the latter three being known under the company name “Airmaster.” All of the single-engine Cessnas cited above featured welded, steel tube fuselages and fully cantilevered, built-up wooden wings and tail surfaces with fabric covering.

## Cessna C/UC-78 (JRC)—1942

Technical Specifications (UC-78)

Type: Staff and passenger utility transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 3,371 (3,304 AAF; 67 USN).

Capacity: One pilot plus four passengers or 800 lbs. of cargo.

Powerplants: Two 245-hp Jacobs R-755-9 7-cylinder air-cooled radial engines driving two-bladed Hamilton Standard variable-pitch metal propellers.

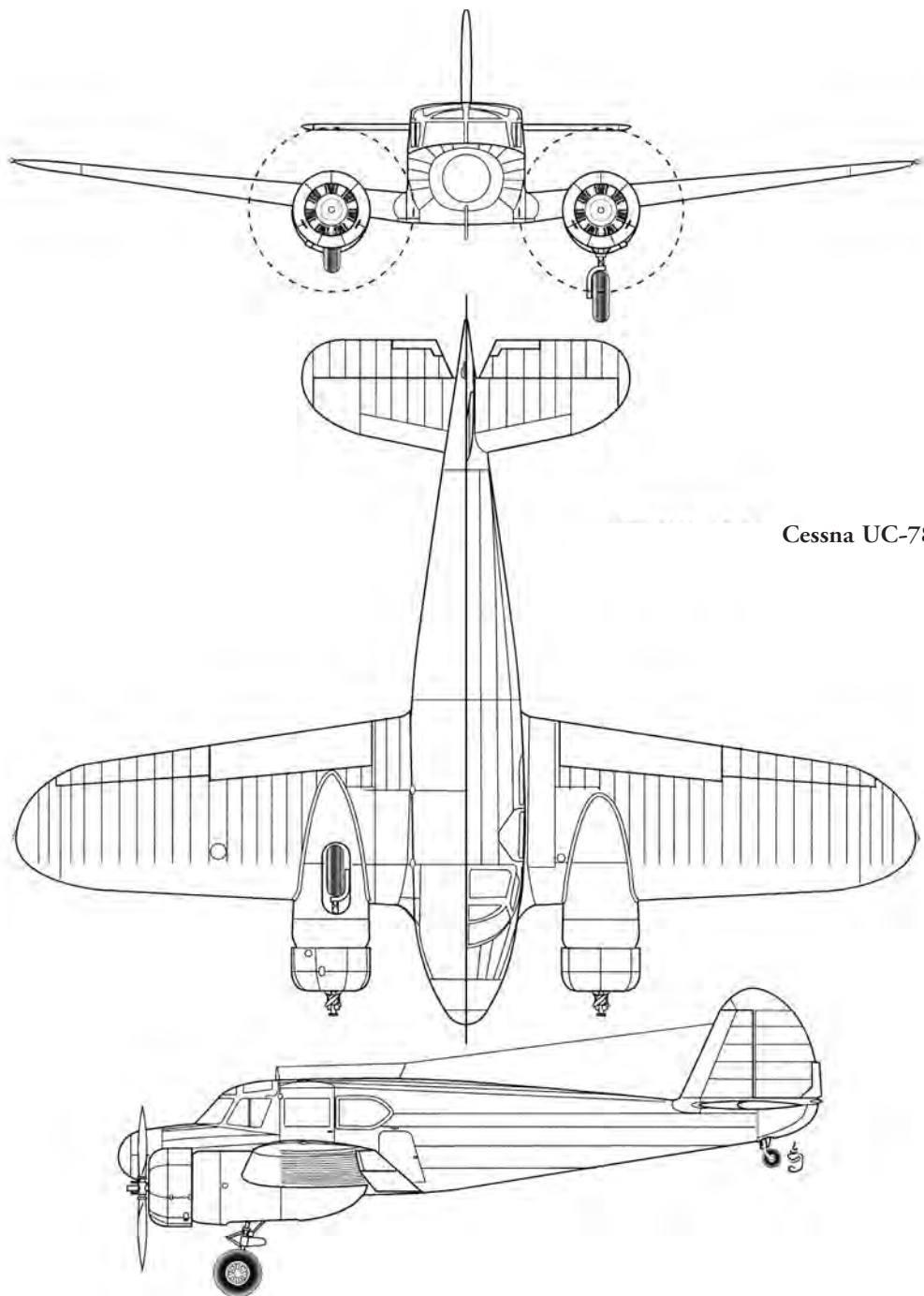
Performance: Max. speed 195-mph, cruise 175-mph; ceiling 22,000 ft.; range 750 mi.

Weights: 3,500 lbs. empty, 5,700 lbs. loaded.

Dimensions: Span 41 ft. 11 in., length 32 ft. 9 in., wing area 295 sq. ft.

Cessna initially offered its twin-engine Model T-50 “Bobcat” to commercial operators in early 1939 as a less expensive alternative to the Beech 18 and Lockheed 14. Most of its aerodynamic design and airframe structure — tubular steel fuselage and built-up wooden wings and tail surfaces with fabric covering — had been derived from the company’s successful single-engine Airmaster series. New features included electrically operated flaps and retractable landing gear. After modest commercial sales, Cessna received its first military contract in 1940, an Air Corps order for 33 T-50s powered by 295-hp Lycoming R-680 engines under the designation AT-8. New AAF contracts awarded to Cessna from 1941 onwards resulted in deliveries of T-50 trainer variants powered by 245-hp Jacobs R-755 engines under new designations: 450 as the AT-17 (fixed-pitch wooden propellers); 223 as the AT-17A (as -17 with metal propellers and increased payload); 466 as the AT-17B (as -17A with equipment changes and 12-volt electrical systems); 60 as the AT-17C (as -17A with upgraded radios); and 60 as the AT-17D (as -17A with equipment changes).

Starting in 1942, the AAF directed Cessna to complete 1,354 AT-17As with 5-seat interiors as small transports under the designation C-78, and the same year, impressed 15 civil T-50s into service as the C-78A. After January 1943, all C-78s and C-78As received utility-cargo (UC) designations. From 1943 through the end of the war, Cessna delivered another 1,806 T-50s as the UC-78B (as -78 with fixed-pitch wooden propellers) and 196 as the UC-78C (as -78B with equipment changes). In addition to AAF production, Cessna manufactured a further 640



Cessna UC-78

UC-78Bs and 182 AT-17As which were Lend-Leased to the RCAF as the *Crane I* and *IA*, respectively. During wartime service, due to deterioration of the wooden wing spars from prolonged exposure to moisture, the AAF issued a 950 lb. reduction in allowable takeoff weight, with affected aircraft being re-designated as follows: UC-78s as the UC-78D, UC-78As as the UC-78E, and UC-78Cs as the UC-78F. After the massive AAF downsizing that followed V-J



One of 1,354 AT-17As converted to five-seat interiors on Cessna's assembly line and accepted into service as the UC-78. Cessna also delivered another 2,002 as the UC-78A and B.

Day, a few UC-78 variants continued in postwar USAF service as utility hacks, but all had been withdrawn by 1949.

*Naval Variants:* In 1942 and 1943, the Navy received 67 UC-78s from the AAF contract under the naval designation JRC-1. In Navy service, JRC-1s were employed mainly to ferry pilots to and from various locations in the continental U.S. for the purpose of making aircraft deliveries. All were sold surplus after the war ended.

## Junkers C-79 —1942

Technical Specifications (Ju 52/3m/C-79)

Type: Passenger and cargo transport.

Manufacturer: Junkers Flugzeug-Work AG, Dessau, Germany.

Total military versions: 1 (AAF).

Capacity: Crew of two plus 17 passengers or 4,000 lbs. of cargo.

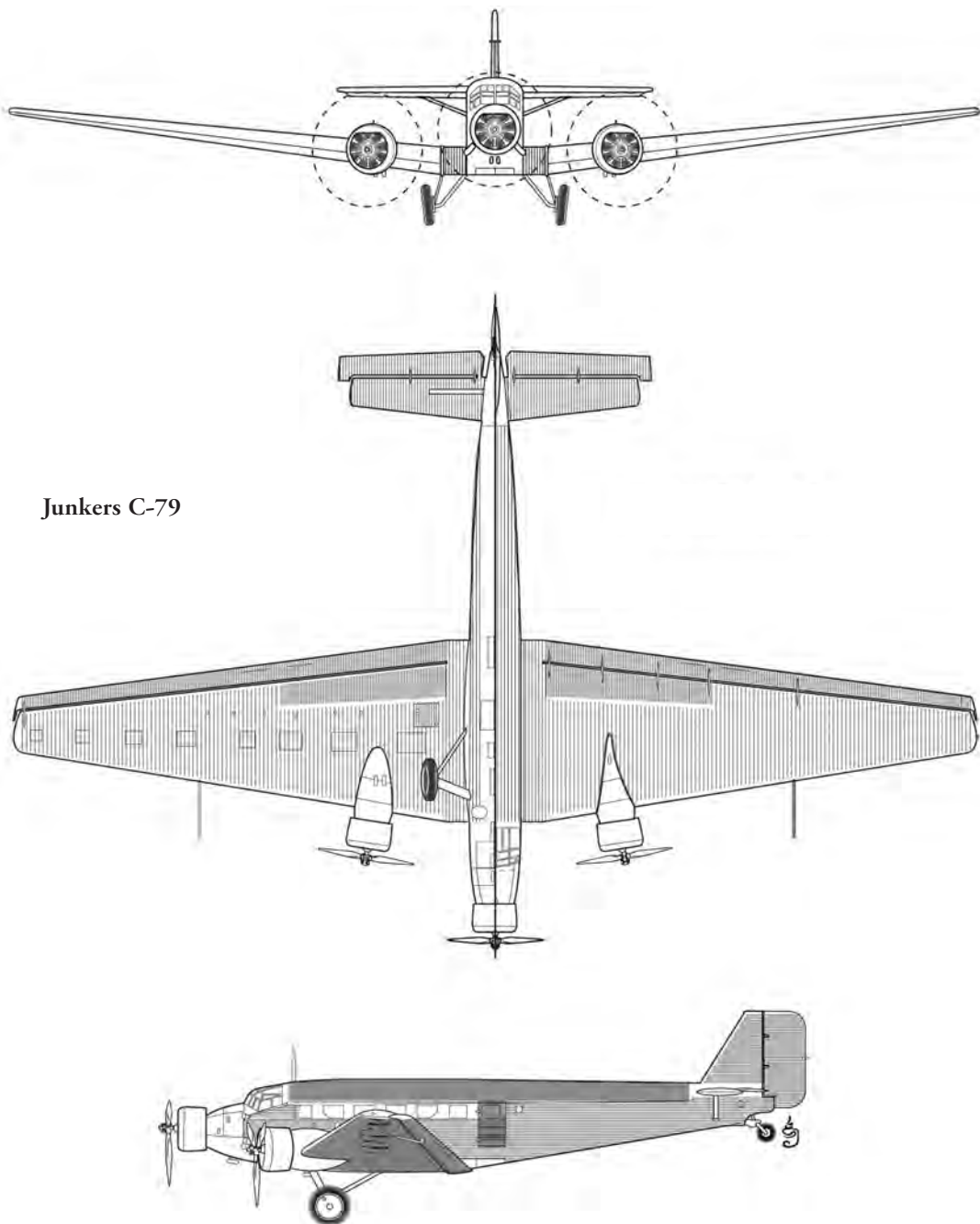
Powerplants: Three 725-hp BMW 132A-3 9-cylinder air-cooled radial engines driving two-bladed fixed-pitch metal propellers.

Performance: Max. speed 168-mph, cruise 138-mph; ceiling 17,050 ft.; range 590 mi.

Weights: 12,610 lbs. empty, 20,330 lbs. loaded.

Dimensions: Span 95 ft. 11 in., length 62 ft., wing area 1,087 sq. ft.

The well-known Junkers Ju 52/3m (three motors) transport made its debut as a civil airliner in 1931, then from the mid-1930s through World War II, produced in large numbers for the German Luftwaffe as a troop and cargo transport and even saw limited use as a bomber. All Ju 52/3ms were low-wing monoplanes characterized by corrugated aluminum skin, angular lines,



Junkers C-79

and fixed landing gear. In May 1942, a Brazilian-registered Ju 52/3m seized by the U.S. government was impressed into AAF service as the C-79 under serial 42-52883 and thereafter assigned to the Panama Air Depot at Albrook Field in the Canal Zone. Records relating to the final disposition of the C-79 are not entirely clear, but it appears to have removed from the AAF inventory in late 1943 and transferred to the Ecuadorian Air Force.





Rare picture of the ex-Brazilian Ju 52/3m seized by the U.S. government in Panama and subsequently impressed into AAF service as the C-79.

### Harlow UC-80—1942

Technical Specifications (UC-80)

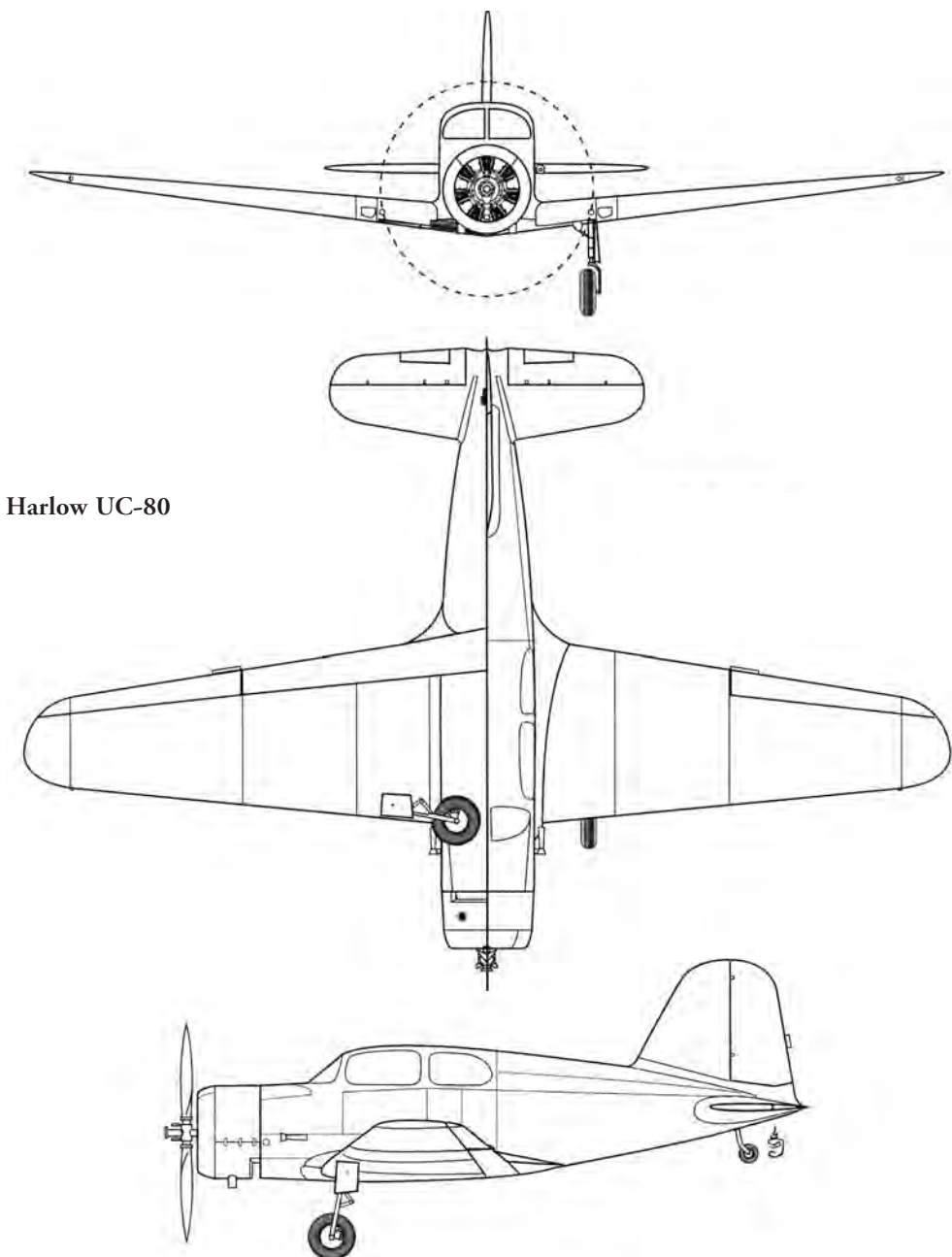
Type: Passenger utility transport.

Manufacturer: Harlow Aircraft Corp., Alhambra, California.

Total military versions: 4 (AAF).



A civil model PJC-2, essentially identical to the four aircraft impressed into AAF service during 1942 as the UC-80.



**Harlow UC-80**

Capacity: One pilot plus three passengers.

Powerplant: One 165-hp Warner R-500 *Super Scarab* 7-cylinder air-cooled radial engines driving a two-bladed fixed-pitch metal propeller.

Performance: Max. speed 160-mph, cruise 140-mph; ceiling 15,500 ft.; range 490 mi.

Weights: 1,661 lbs. empty, 2,294 lbs. loaded.

Dimensions: Span 35 ft. 10 in., length 23 ft. 4 in., wing area 185 sq. ft.

Max Harlow, an aeronautical engineer and college instructor, conceived the PJC-1 (named for Pasadena Junior College, where he taught) as a project to be built by his engineering class.

It materialized as a very modern low-wing monoplane featuring semi-monocoque aluminum construction, fully cantilevered wings and tail surfaces, and retractable landing gear. The PJC-1 flew for the first time in September 1937 but was destroyed in a crash during type certification. In 1938, once certification had been obtained, Harlow formed a company to manufacture the essentially identical PJC-2, and 10 had been completed by the time the U.S. entered World War II. Afterward, four PJC-2s were impressed into AAF service as the UC-80, however, details of their use and disposition is not known. Harlow's subsequent efforts to market the PC-5 prototype as a two-place military trainer based on PJC-2 were ultimately unsuccessful.

### Stinson UC-81 and L-12 (RQ/R3Q)—1935

Technical Specifications (SR-9E/UC-81J)

Type: Staff and passenger utility/liaison transport.

Manufacturer: Stinson Aircraft Corp. (later Stinson Aircraft Div, Consolidated-Vultee Corp.), Wayne, Michigan.

Total military versions: 50 (48 AAF; 2 USN/USCG), not including military trainer variants.

Capacity: One pilot plus four passengers.

Powerplant: One 320-hp Wright R-760-E2 *Whirlwind* 7-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 161-mph, cruise 150-mph; ceiling 14,500 ft.; range 600 mi.

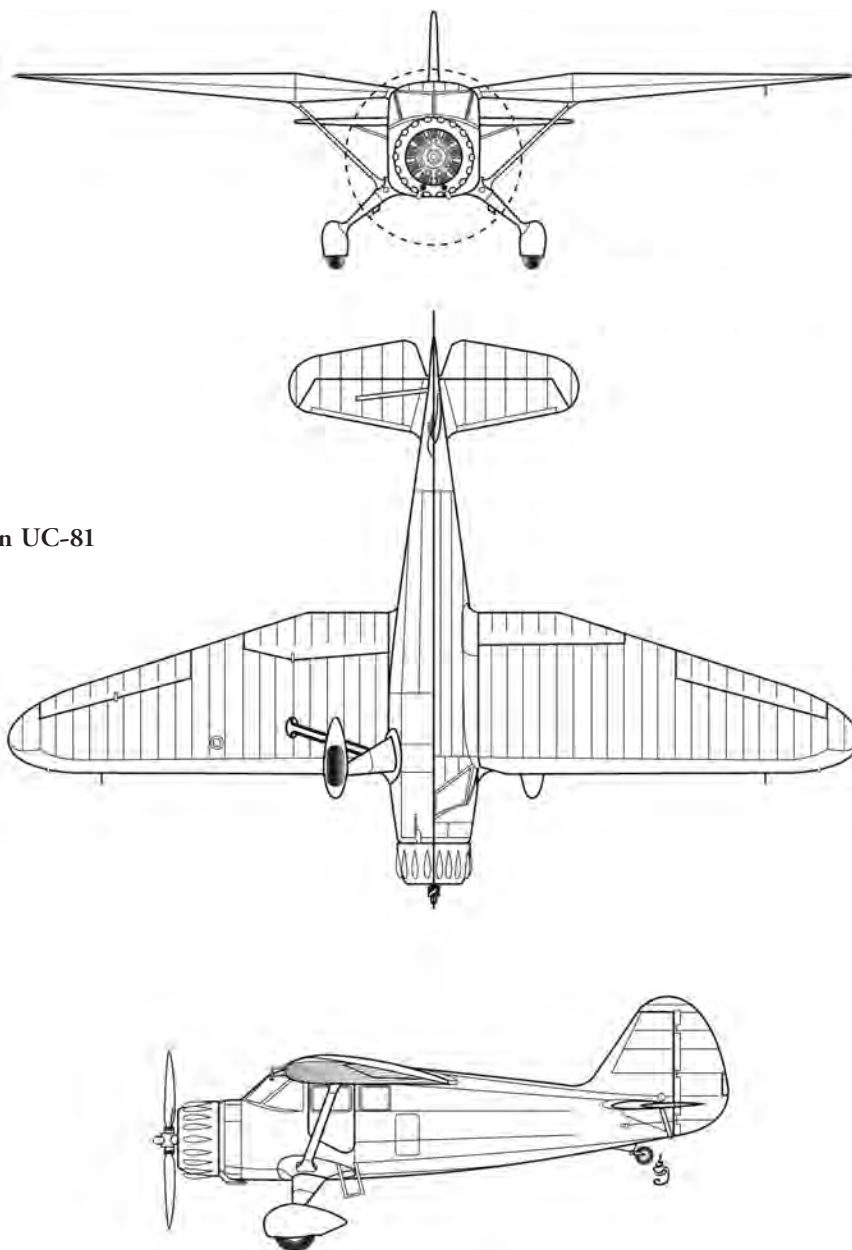
Weights: 2,457 lbs. empty, 3,876 lbs. loaded.

Dimensions: Span 41 ft. 10 in., length 28 ft. 1 in., wing area 258 sq. ft.

Like the wide variety of cabin Wacos reported earlier as UC-72 variants, the AAF impressed 44 (historical sources differ on the exact number) civil Stinson "Reliants" (SR) during World War II as the UC-81 under a variety of suffixes, plus two as the L-12 and two as the L-12A. Stinson produced 1,327 civil Reliants between 1933 and 1941 in a progressively improved series numbered from SR-1 to SR-10. All Reliants were fabric-covered, high-wing monoplanes con-



One of the 48 civil Stinson Reliants impressed into AAF service during World War II. Actual sub-variant is not readily apparent from the photograph but is easily distinguished from an AT-19 by the bump cowling and wheel pants.

**Stinson UC-81**

structed with steel tube fuselage frames and built-up wooden wings and tail surfaces, and starting with the SR-7 in 1936, featured a compound tapered wing configuration known as the “gull-wing.” Stinson used various suffixes after the model number (e.g., SR-7B, SR-8E, SR-9C, etc.) to identify various radial powerplants. Between 1942 and 1945, after being absorbed by Consolidated-Vultee, Stinson also produced 500 Model V-77 (SR-10J) Reliants under AAF contacts as the AT-19, with most going to Great Britain under Lend-Lease.

Civil Stinson Reliants impressed into AAF service after 1941 received the following designations: four SR-8Bs (245-hp Lycoming R-680-B6 engines) as the UC-81; two SR-10Gs (290-hp Lycoming R-680-E1 engines) as the UC-81A; one SR-8E (320-hp Wright R-760-E2 engine)



Stinson SR-5A placed on the Coast Guard inventory in 1935 as the RQ-1 but subsequently changed to XR3Q-1 to conform to the Navy SR-5A acquired in 1934. This aircraft was assigned to Floyd Bennett Field, New York.

as the UC-81B; three SR-9Cs (260-hp Lycoming R-680-B5 engines) as the UC-81C; one SR-10F (450-hp Pratt & Whitney R-985-25 engine) used in glider pickup experiments as the XC-81D; four SR-9Fs (400-hp Pratt & Whitney R-985-13 engines) as the UC-81E; seven SR-10Fs (450-hp Pratt & Whitney R-985-25 engines) as the UC-81F; three SR-9Ds (285-hp Wright R-760-E2 engines) as the UC-81G; one SR-10E (320-hp Wright R-760-E2 engine) as the UC-81H; nine SR-9Es (320-hp Wright R-760-E2 engines) as the UC-81J; five SR-10Cs (260-hp Lycoming R-680-D5 engines) as the UC-81K; two SR-8Cs (260-hp Lycoming R-680-B5 engines) as the UC-81L; one SR-9EM (320-hp Wright R-760-E2 engine, M = cargo interior) as the UC-81M; two SR-9Bs (245-hp Lycoming R-680-B4 engines) as the UC-81N; two SR-5As (245-hp Lycoming R-680-B4 engines, 1934 straight-wing version) as the UC-81P; and two SR-7Bs (245-hp Lycoming R-680-B4 engines) as the L-12A. The designation switch to L for liaison may have resulted from assignment to Army field units. All ex-civil Reliants were returned to their owners or sold surplus after the war.

*Naval Variants:* The Navy purchased one Stinson SR-5A in 1934 under the designation XR3Q-1 and thereafter assigned it as a utility transport at NAS Sunnyvale (later renamed Moffett Field) in California. A second SR-5A acquired in 1935 went into service with the Coast Guard at Floyd Bennett Field in Brooklyn, New York, initially as the RQ-1 but later changed to XR3Q-1 to conform with its Navy counterpart. This aircraft was used to test electronic equipment until 1939, when it was transferred to the Air Patrol Detachment at Cape May, New Jersey. Both XR3Q-1s had been stricken from the inventory by the end of 1941.



## Fairchild C-82 —1944

Technical Specifications (C-82A)

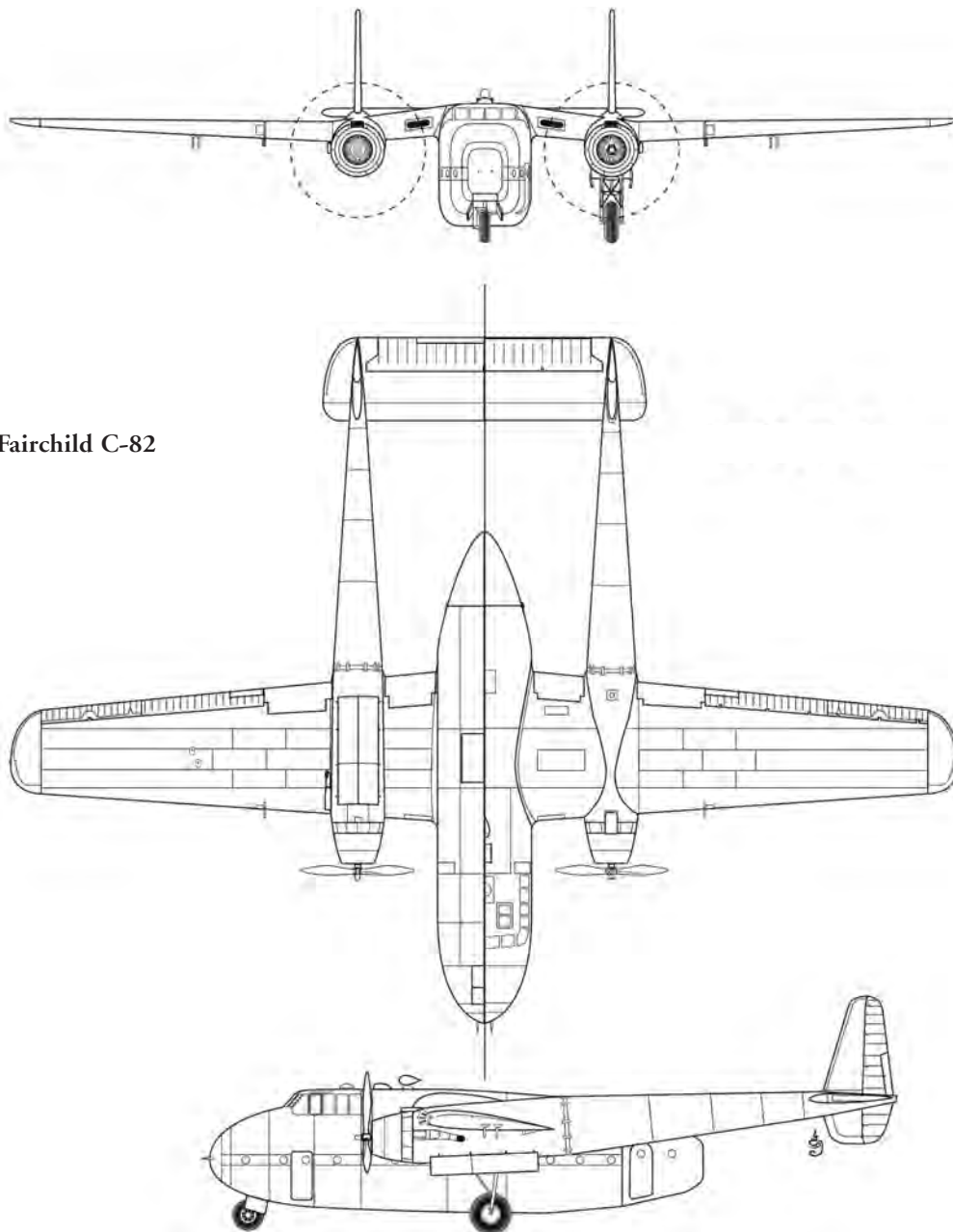
Type: Tactical transport.

Manufacturer: Fairchild Engine & Airplane Corp., Hagerstown, Maryland.

Total military versions: 224 (AAF/USAF).

Capacity: Crew of three plus 42 troops, 34 medical litters, or 18,000 lbs. of cargo.

Powerplants: Two 2,100-hp Pratt & Whitney R-2800-85 *Double Wasp* 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.



Fairchild C-82





**One of the last of 220 C-82As delivered between 1945 and 1948. Virtually all had been replaced by C-119s in frontline Troop Carrier units before the end of 1952.**

Performance: Max. speed 250-mph, cruise 218-mph; ceiling 27,000 ft.; range 2,140 mi.

Weights: 13,500 lbs. empty, 47,200 lbs. loaded, 54,000 lbs. max. takeoff.

Dimensions: Span 106 ft. 6 in., length 77 ft. 1 in., wing area 1,400 sq. ft.

The Fairchild C-82 is distinguished as having been the first mass-produced American transport designed from the outset for the military troop carrier, cargo, medical evacuation, and glider-tug roles. A War Department requirement issued in mid-1941 was motivated by two concerns: first, existing transports like the C-46 and C-47 — both derived from civil airliner designs — were not ideally suited to operations in the field; and second, with orders pending on thousands of new military aircraft, war planners expected shortages in the supply of light metal alloys like aluminum. The detailed AAF specification called for a twin-engine transport — comparable in performance to a C-47 — that would be constructed of wood, powered by Pratt & Whitney R-1830 engines, and capable of being end-loaded from a level position at average truck-bed height. Fairchild, one of four manufacturers responding, submitted its proposed Model 78 in November 1941 and went so far as to complete a mockup during early 1942. AAF Material Command liked Fairchild's twin-boom, rear-loading approach to the concept, however, by mid-1942, official concerns over aluminum shortages had diminished to the point that Fairchild's specification was revised to require a substantially larger, all-metal aircraft which would be powered by Pratt & Whitney R-2800 engines and capable of carrying the 23,600 lb. payload of a C-46.

Under the new requirements, Fairchild received a development contract in August 1942 to build one static test airframe plus two flyable prototypes under the designation XC-82. As Armand J. Thieboldt and his engineering team finalized the detailed design, the XC-82 emerged with a fuselage cross-section deep enough to place the flight deck and wing spars well above the cargo bay, with the twin-boom arrangement giving unobstructed access to clamshell-type doors that opened to the full width of the rear fuselage. To shorten the length of the main gear legs, the inboard wings panels were gulled down slightly. Construction of a prototype proceeded over the next two years, with the XC-82 making its first flight from the Hagerstown plant on September 10, 1944. Within only weeks of initial testing, AAF Material Command was sufficiently encouraged to cancel the second prototype and give Fairchild the go-ahead proceed with production of 100 aircraft as the C-82A. Although the AAF assigned "Packet" as the C-82's official name, the prototype was popularly referred to as the "Flying Boxcar," and the name stuck. By early 1945, Fairchild's contract had been increased to 220 C-82As, with a further 997 to be built under license by North American as the C-82N. In the aftermath of the massive V-J Day military cutbacks in late 1945, the AAF elected to continue Fairchild's contract with the plan that C-82As would replace Troop Carrier Command's aging fleet of C-46s and C-47s, but terminated North American's when only three C-82Ns had been completed.

Deliveries of C-82As to the AAF commenced in late 1945, and with the 11th production model, the nose was lengthened 14.75 inches, giving it a more pointed contour, and the aircraft left in a bare-metal finish rather than the previous olive drab. The USAF accepted the last C-82A in 1948. In early operational service with troop carrier and transportation units, C-82As proved to be too underpowered for their designed mission, causing restrictions to be placed on payload, range, and serviceability. In 1946, to address these problems, the AAF authorized Fairchild to hold back one C-82A for the purpose of initiating modifications under the designation XC-82B. But when the XC-82B appeared in November 1947, the redesign had been so far-reaching that the aircraft was re-designated the XC-119A, which is reported under a separate heading below. In 1947 and 1948, after eighteen C-82As had been equipped with belly doors to drop rescue gear and supplies, they were re-designated SC-82A and served with MATS until 1952. Two C-82As were set aside to become EC-82As in 1948, one equipped with skis to evaluate snow operations and the other with tracked undercarriage in place of wheels for rough-field experiments; however, the program ended in 1949 after the tests were deemed unsatisfactory.

From 1946 to 1950, C-82As entered service with seven different Troop Carrier Groups (TCG) based within the continental U.S. In this role, C-82As participated in numerous airlift exercises in which division-sized Army combat units and their equipment were moved in long-distance deployments. During the Berlin Airlift (June 1948-May 1949), five C-82As temporarily assigned to MATS carried vehicles and equipment into Berlin that would not fit into C-54s. As part of "Operation Haylift" in January and February 1949, 43 C-82As from two TCGs dropped over 2,100-tons of hay to thousands of cattle stranded in the northwest U.S. during a blizzard. The C-82A's service career was brief, the phase-out in troop carrier units beginning in early 1950 as soon new Fairchild C-119Bs and Cs arrived to replace them, and the process had been completed by the end of 1952. Some C-82As continued in other roles such as air rescue, airways (navigation) and communication system maintenance, and technical training until the last examples were withdrawn and sold surplus in 1954. One historical source indicates that 54 C-82As were procured by the U.S. Navy as the R2Q-1 at some point, however, no official record of them exists.

## Consolidated C-87 and C-109 (RY)—1942

### Technical Specifications (C-87)

Type: Long-range passenger and cargo transport.

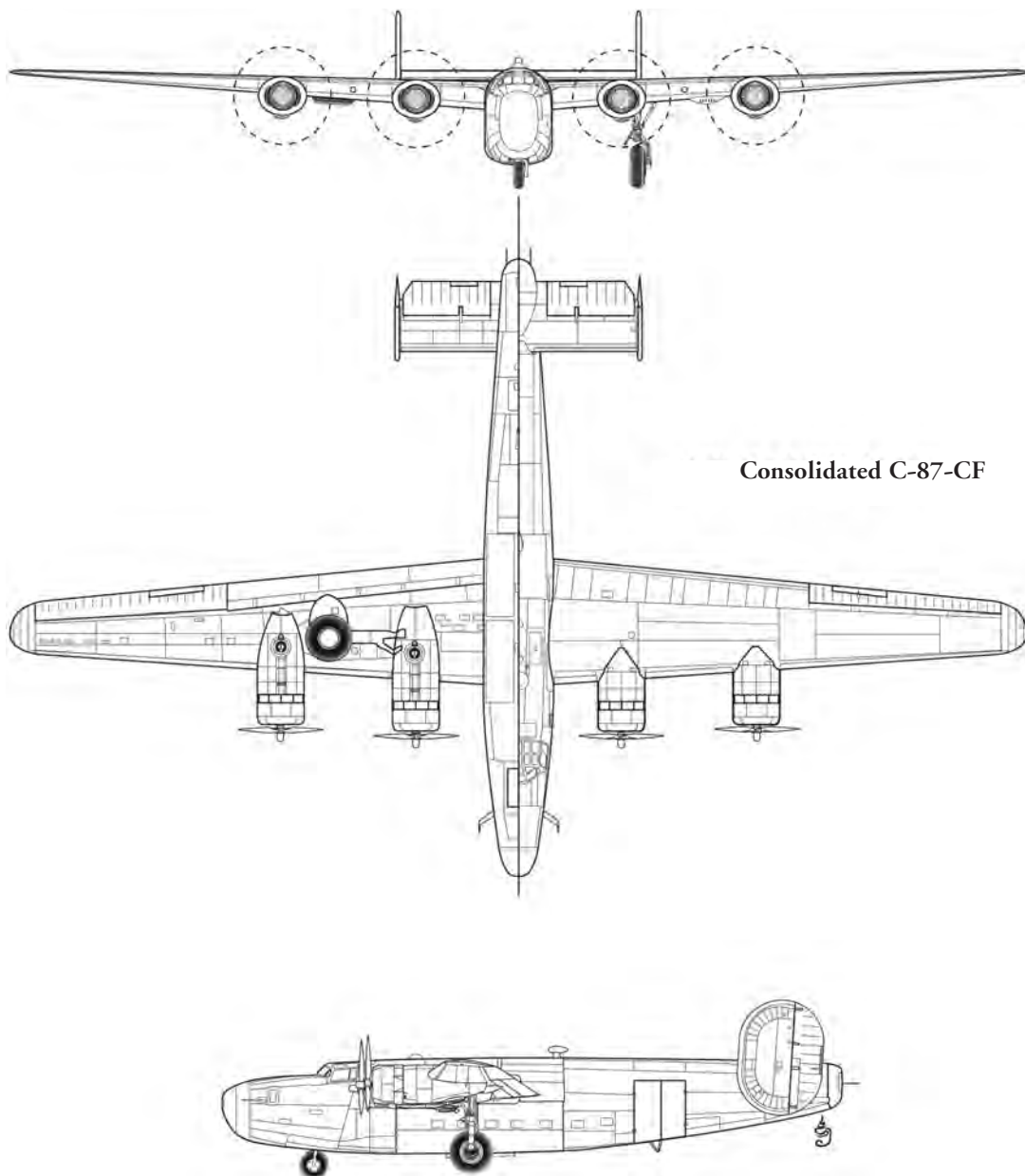
Manufacturer: Consolidated Aircraft Corp., Fort Worth, Texas.

Total military versions: 513 (489 AAF; 24 USN/USMC), 23 exported under Lend-Lease.

Capacity: Crew of four plus 25 passengers or 10,000 lbs. of cargo.

Powerplants: Four 1,200-hp Pratt & Whitney R-1830-43 *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

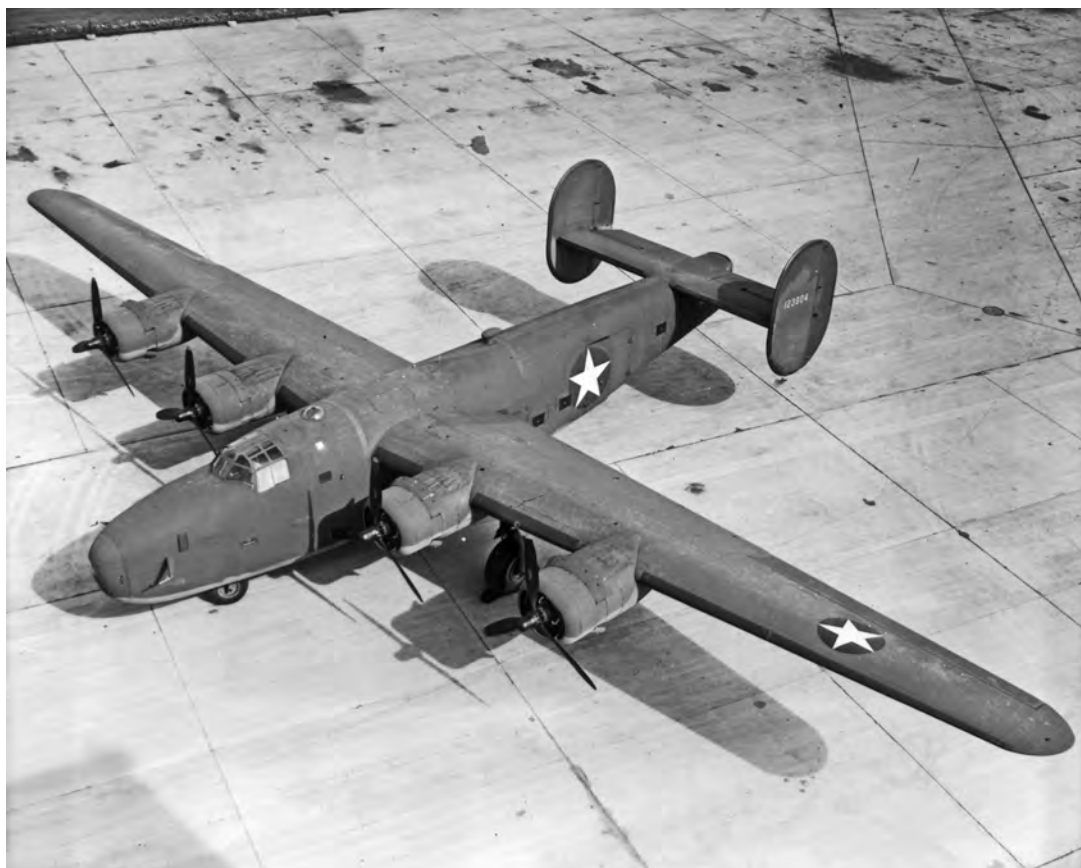
Performance: Max. speed 300-mph, cruise 215-mph; ceiling 28,000 ft.; range 2,140 mi.



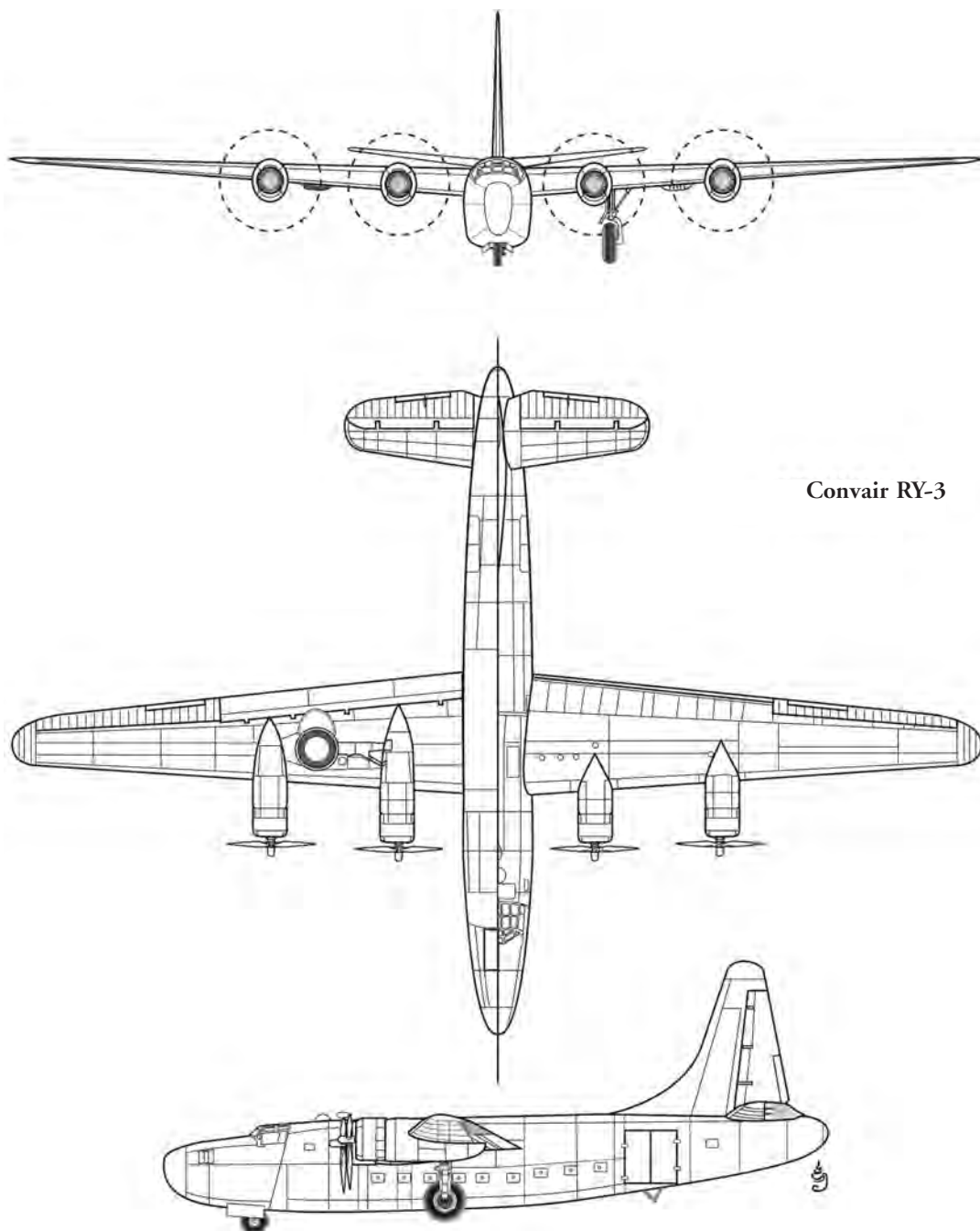
Weights: 30,645 lbs. empty, 56,000 lbs. loaded.

Dimensions: Span 110 ft., length 66 ft. 4 in., wing area 1,048 sq. ft.

The C-87 “Liberator Express” came into being during 1942 as a direct development of Consolidated’s B-24D bomber. At the time the U.S. entered World War II, Ferrying Command (later ATC) was faced with a critical shortage of long-range transports. In early 1942, as a gap-filling measure, AAF Material Command ordered a lightly damaged B-24D to be rebuilt into a transport configuration. All armament and bombing equipment was removed, the nose glazing and tail turret faired over with a sheet aluminum, and a floorboard installed through the bomb bay into the waist compartment. Rectangular windows, a left-side cargo door, and 25 passenger seats came next. After brief evaluations at Bolling Field, Material Command ordered the new type into production as the C-87. The first 73 were converted from existing B-24Ds but the remainder built as transports from the start, and in all, the Fort Worth plant completed 278 C-87s between September 1942 and August 1944. During the production run, six C-87s fitted with 16-seat VIP interiors became the C-87A and five converted as flight engineer trainers the AT-22 and later, TB-24D. Two other C-87 variants were proposed but never built: a C-87B with gun armament and a C-87C based on the Navy RY-3, which is discussed below.



Factory new AAF C-87 seen in 1942 or 1943. Initially, most C-87s were assigned to ATC, flying from the continental U.S. to India, then over the “Hump” into China. Replaced by C-54s during the latter stages of the war.

**Convair RY-3**

As wartime deliveries proceeded, most C-87s served with ATC. One of the common routes initially assigned to them involved a 12,000-mile trek from Patterson Field, Ohio, across the Atlantic to India via Africa, then over the Himalaya Mountains to destinations in eastern China. In addition to the AAF, four airlines operating under overall ATC control (Consairways [a subsidiary of Consolidated], American, United, and TWA) flew C-87s on over-ocean routes from the continental U.S. to various Allied military commands in Europe and the Pacific. Fires caused





The RY-3, characterized by its single fin and longer fuselage, appeared in 1945 as a transport development of the PB4Y-2. When the war ended, the Navy limited the contract to the 34 aircraft accepted.

by persistent fuel leaks and dangerous flight characteristics in icing conditions made C-87s highly unpopular with aircrews, so that they were removed from ATC's longer routes as soon as C-54s became available to replace them, and all were disposed of soon after the war ended.

In early 1944 AAF Material Command commenced a program to convert a number of B-24 bombers as fuel transports under the designation C-109. The XC-109 was derived from a B-24E stripped of all armament and bombing equipment and fitted with six new fuselage fuel tanks, one in the nose, two in the bomb bay, and three aft of the wings, totaling 2,400-gallons. After testing, a further 218 B-24Js and Ls underwent similar conversions with fuel capacity upped to 2,900-gallons. Initially, all C-109s served with 10th AF in India flying fuel over the Himalayas into China to support early B-29 operations, however, after acquisition of the Mariana Island bases for the B-29s, many C-109s were transferred to ATC control where they were used to as fuel transports in other theaters of the war. Like C-87s, they were withdrawn as soon as the war ended.

*Naval Variants:* During World War II, the Navy acquired eight C-87 variants built under AAF serials, three C-87As with VIP interiors under the designation RY-1 and five stock C-87s as the RY-2. In 1944 BuAer ordered 112 RY-3s, a transport variant based upon the PB4Y-2 (a naval development of the B-24 featuring a seven-foot fuselage stretch, a single fin, and no turbo-superchargers), however, only 34 had been built at the time the contract was terminated in late 1945: 15 delivered to the Navy and one to the Marine Corps as the RY-3, plus 23 Lend-Leased to Britain as the *Liberator C.IX*. The last Navy RY-3 was retired in 1948.



**UC-88 (see Fairchild JK in Part B)**

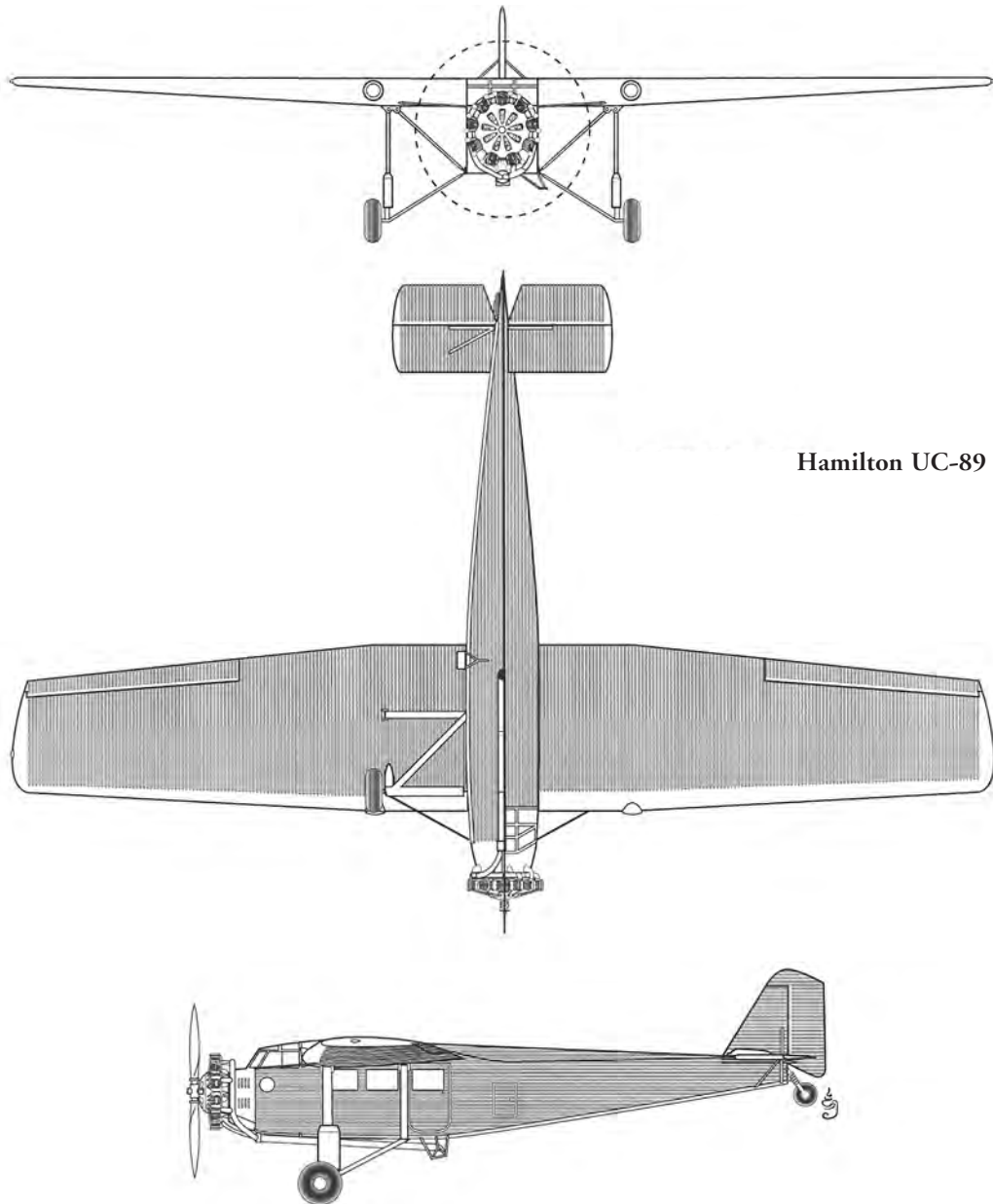
**Hamilton C/UC-89 —1942**

Technical Specifications (C-87)

Type: Passenger and cargo utility transport.

Manufacturer: Hamilton Metalplane Co. (subsidiary of Boeing), Milwaukee, Wisconsin.

Total military versions: 1 (AAF).



**Hamilton UC-89**



Although historical data indicates this aircraft was seized in Panama in August 1942, the markings applied suggest an earlier date, before the red circle was removed from the star in May 1942.

Capacity: Crew of one or two plus six passengers or 2,300 lbs of cargo.

Powerplant: One 525-hp Pratt & Whitney R-1690-5 *Hornet* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard fixed-pitch metal propeller.

Performance: Max. speed 145-mph, cruise 125-mph; ceiling (not reported); range 600 mi.

Weights: 3,600 lbs. empty (est.), 5,900 lbs. loaded (est.).

Dimensions: Span 54 ft. 5 in., length 34 ft. 8 in., wing area (not reported).

Resembling scaled-down Ford Trimotors, all of the Hamilton H-45s and -47s completed in 1928 began their careers with commercial operators carrying mail, passengers, and light cargo. Utilizing the patented Junkers' system of corrugated aluminum skin on an extruded structural framework, Hamilton became one of the early developers of all-metal aircraft in the U.S. William Boeing reportedly bought the company in 1926 to learn its fabrication techniques. The 25 H-45s and 21 H-47 differed only in engine type, the former being powered by 450-hp *Wasps* and the latter by 525-hp *Hornets*. In August 1942, the AAF seized a Panamanian-registered H-47 and impressed it into to service under the designation C-89. Assigned to the Panama Air Depot, the aircraft was re-designated UC-89 in 1943, and then after only a year of service, declared "unsuitable" and stricken from the inventory.

## Luscombe C/UC-90—1942

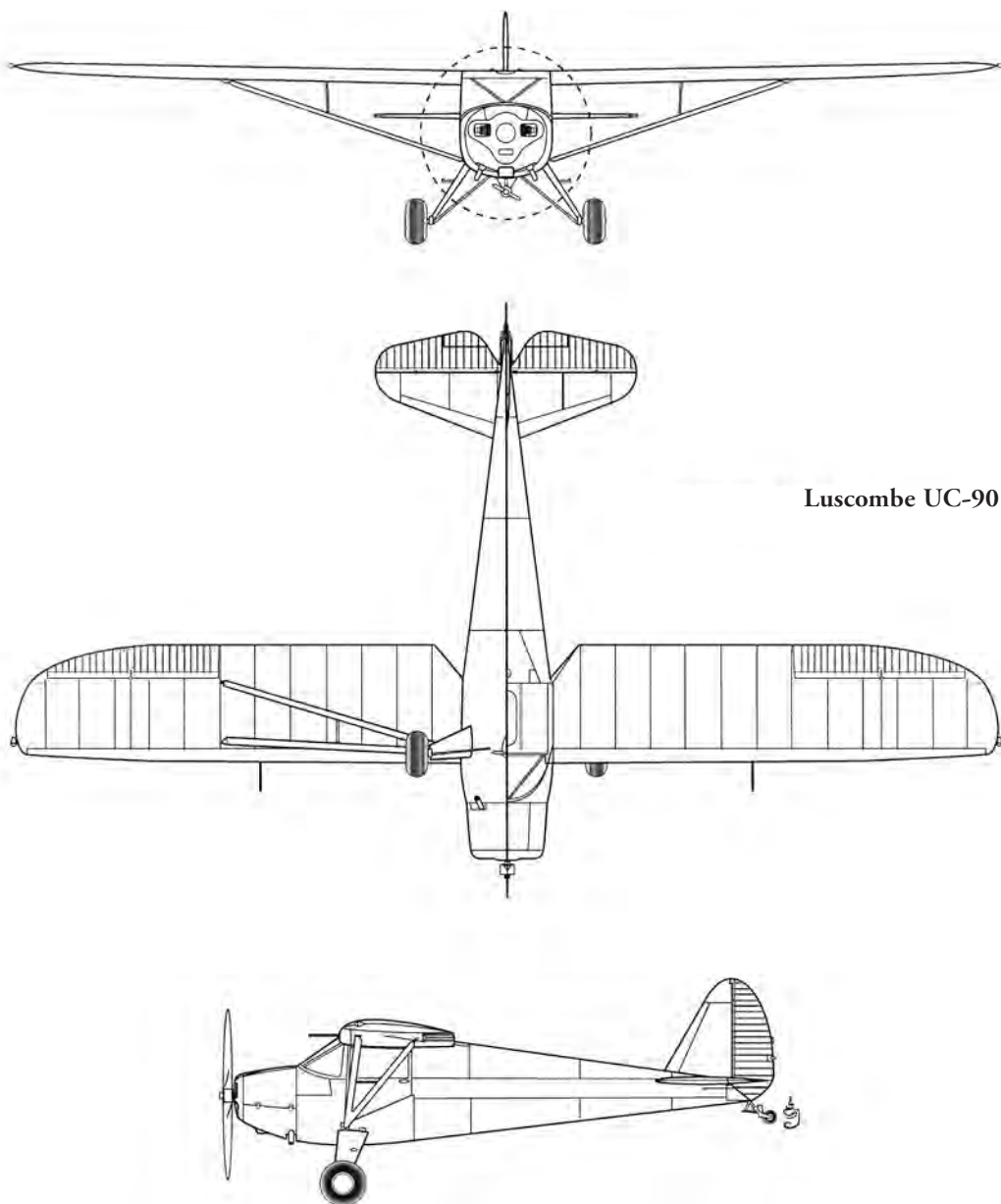
Technical Specifications (UC-90A)

Type: Light utility transport.

Manufacturer: Luscombe Airplane Co., Kansas City, Missouri.

Total military versions: 2 (AAF).

Capacity: One pilot plus one passenger.

**Luscombe UC-90**

Powerplant: One 65-hp Continental O-170 A-65 4-cylinder air-cooled horizontally opposed engine driving a two-bladed Sensenich fixed-pitch wooden propeller.

Performance: Max. speed 115-mph, cruise 105-mph; ceiling 14,000 ft.; range 400 mi.

Weights: 729 lbs. empty, 1,260 lbs. loaded.

Dimensions: Span 34 ft. 7 in., length 20 ft., wing area 140 sq. ft.

The two Luscombes impressed in 1942 were, in terms of weight, probably the smallest “transports” to be placed on the AAF inventory during World War II. The Luscombe 50 (Model 8) had appeared on American civil market in 1937 as one the earliest lightplanes to incorporate all-metal construction throughout, a semi-monocoque fuselage with fabric-covered, metal framed wings, and 557 had been delivered by the time the U.S. entered the war. While numerous Model



**A civil model 8A Silvaire, essentially identical to the single example impressed into AAF service during 1942 as the UC-90A.**

8s saw use in the government subsidized Civilian Pilot Training program (CPT) in which private flying schools trained prospective military pilots, none were ever ordered under AAF serials. Coincidentally, the two aircraft taken by the AAF were both based in Panama, the first, a Model 8B with a 65-hp Lycoming engine, was assigned the designation C-90 and the other, an 8A with a 65-hp Continental, as the C-90A, then in 1943, they became the UC-90 and -90A, respectively. Both operated from Albrook Field in the Panama Canal Zone for the duration of the war.

## Stinson C-91—1942

Technical Specifications (C-91)

Type: Passenger and cargo transport.

Manufacturer: Stinson Aircraft Corp., Wayne, Michigan.

Total military versions: 1 (AAF).

Capacity: Crew of two plus nine passengers or 2,930 lbs. of cargo.

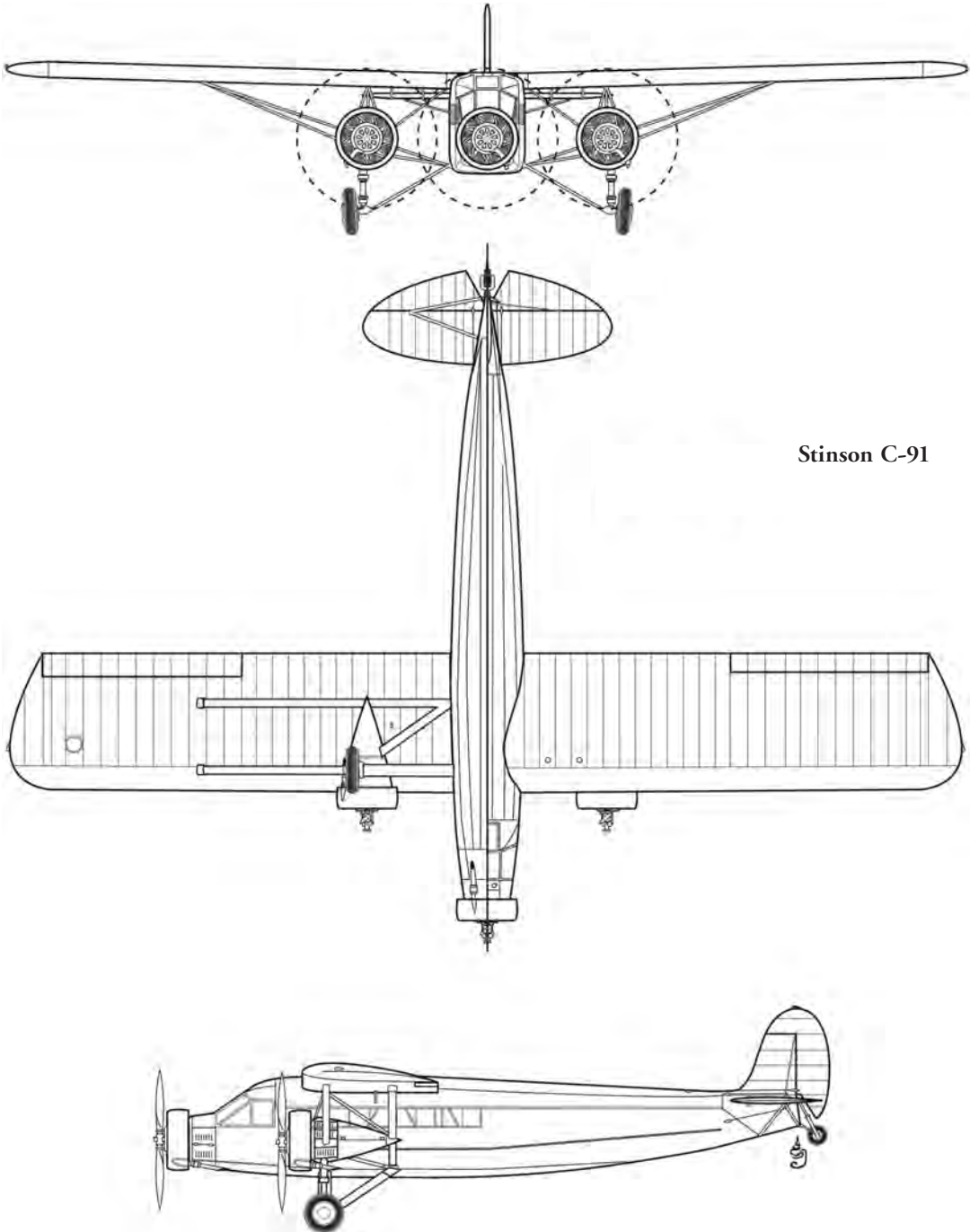
Powerplants: Three 215-hp Lycoming R-680-B 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 146-mph, cruise 125-mph; ceiling 14,200 ft.; range 390 mi.

Weights: 5,670 lbs. empty, 8,600 lbs. loaded.

Dimensions: Span 60 ft., length 42 ft., wing area 490 sq. ft.

The Stinson SM-6000, also known as the Model T, was introduced as a 10-seat airliner in 1930, with 53 having been delivered when production ceased in 1932. SM-6000s were fabric-

**Stinson C-91**

covered high-wing monoplanes constructed of welded, steel tube fuselages with built-up wooden wings and tail surfaces. Few details are available on use and disposition of the single example impressed into AAF service during World War II as the C-91. One source suggests that the aircraft served at Albrook Field in the Panama Canal Zone.



An SM-6000 owned by Chicago & Southern Air Lines during the 1930s, very similar to the aircraft impressed into AAF service in 1942 as the C-91.

### Funk C/UC-92 —1942

Technical Specifications (UC-92)

Type: Light utility transport.

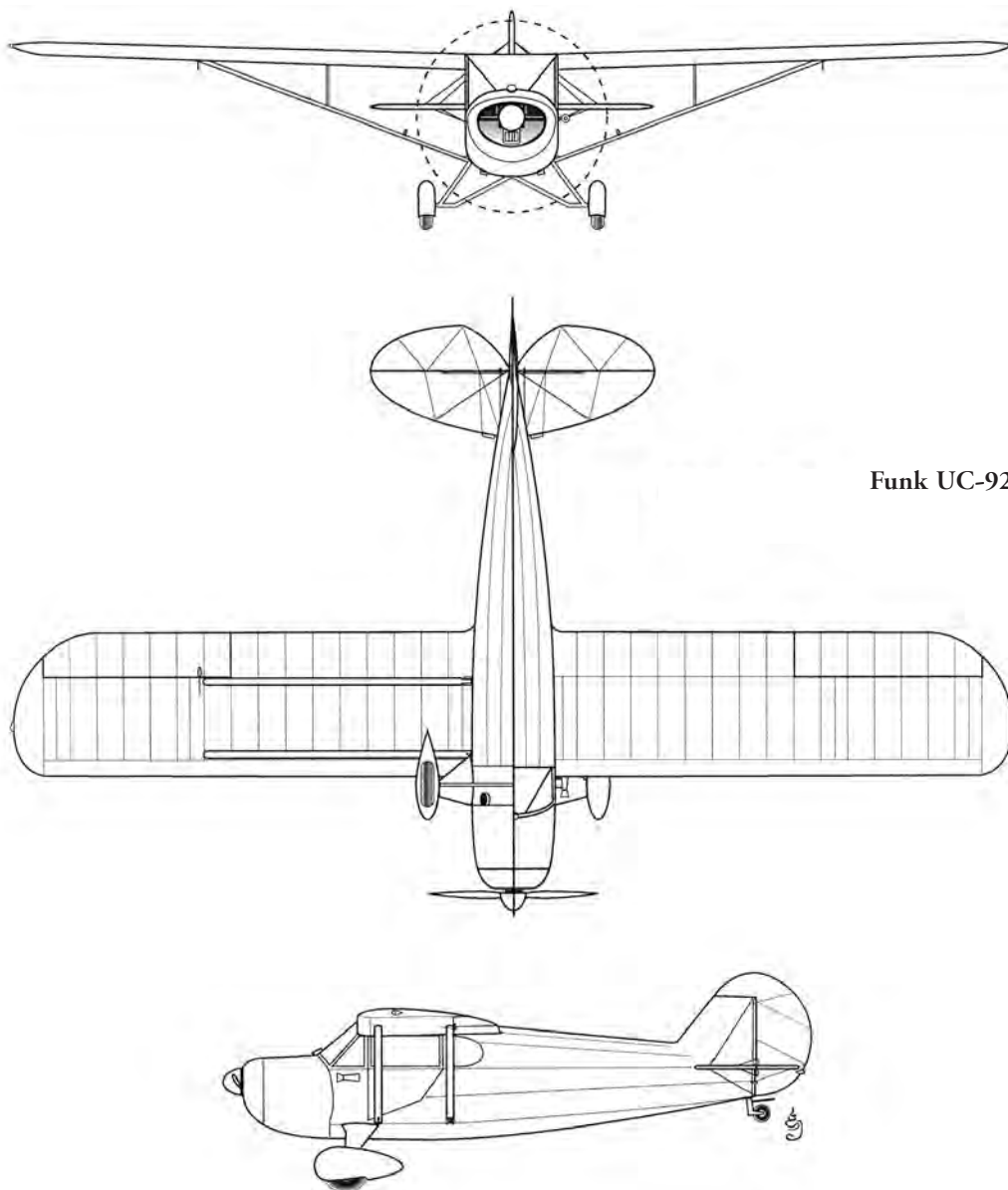
Manufacturer: Akron Aircraft Co., Inc., Akron, Ohio.

Total military versions: 1 (AAF).



A civil registered Funk B75L serving with the Civil Air Patrol after the war. A similar B75L was impressed into the AAF in 1942 as the UC-92.





Funk UC-92

Capacity: One pilot plus one passenger.

Powerplant: One 75-hp Lycoming O-145-C2 4-cylinder air-cooled horizontally opposed engine driving a two-bladed Sensenich fixed-pitch wooden propeller.

Performance: Max. speed 115-mph, cruise 103-mph; ceiling 15,500 ft.; range 350 mi.

Weights: 890 lbs. empty, 1,350 lbs. loaded.

Dimensions: Span 35 ft., length 20 ft. 5 in., wing area 169 sq. ft.

The UC-92 provides yet another example of the odd collection of impressed civilian aircraft serving with the 6th AF in the Panama Canal Zone. The Funk Model B, named for Akron Aircraft Co. founders Howard and Joe Funk, appeared in 1939 as a high-wing monoplane of mixed construction with a welded, steel tube fuselage and fabric-covered, wooden wings. It was produced in three pre-war versions according to type of powerplant used: a Model B with a 63-hp

Ford four-cylinder auto engine, a Model B75L with a 75-hp Lycoming O-145-C2 engine, and a Model B85C with an 85-hp Continental O-190-C85 engine. During the war, the AAF impressed one Model B75L under the assigned designation UC-92. One historical source indicates the aircraft was based at Albrook Field in the Panama Canal Zone, then sold surplus in Panama once the war ended.

## C-93 (see Budd RB-1 in Part B)

### Boeing C-97 — 1944

Technical Specifications (C-97A)

Type: Long-range strategic airlift transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 72 (AAF/USAF), not including 816 variants originally built as aerial refueling tankers.

Capacity: Crew of four plus 134 troops, 69 medical litters, or 52,800 lbs. of cargo.

Powerplants: Four 3,500-hp Pratt & Whitney R-4360-59B *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 375-mph, cruise 300-mph; ceiling 30,200 ft.; range 4,300 mi.

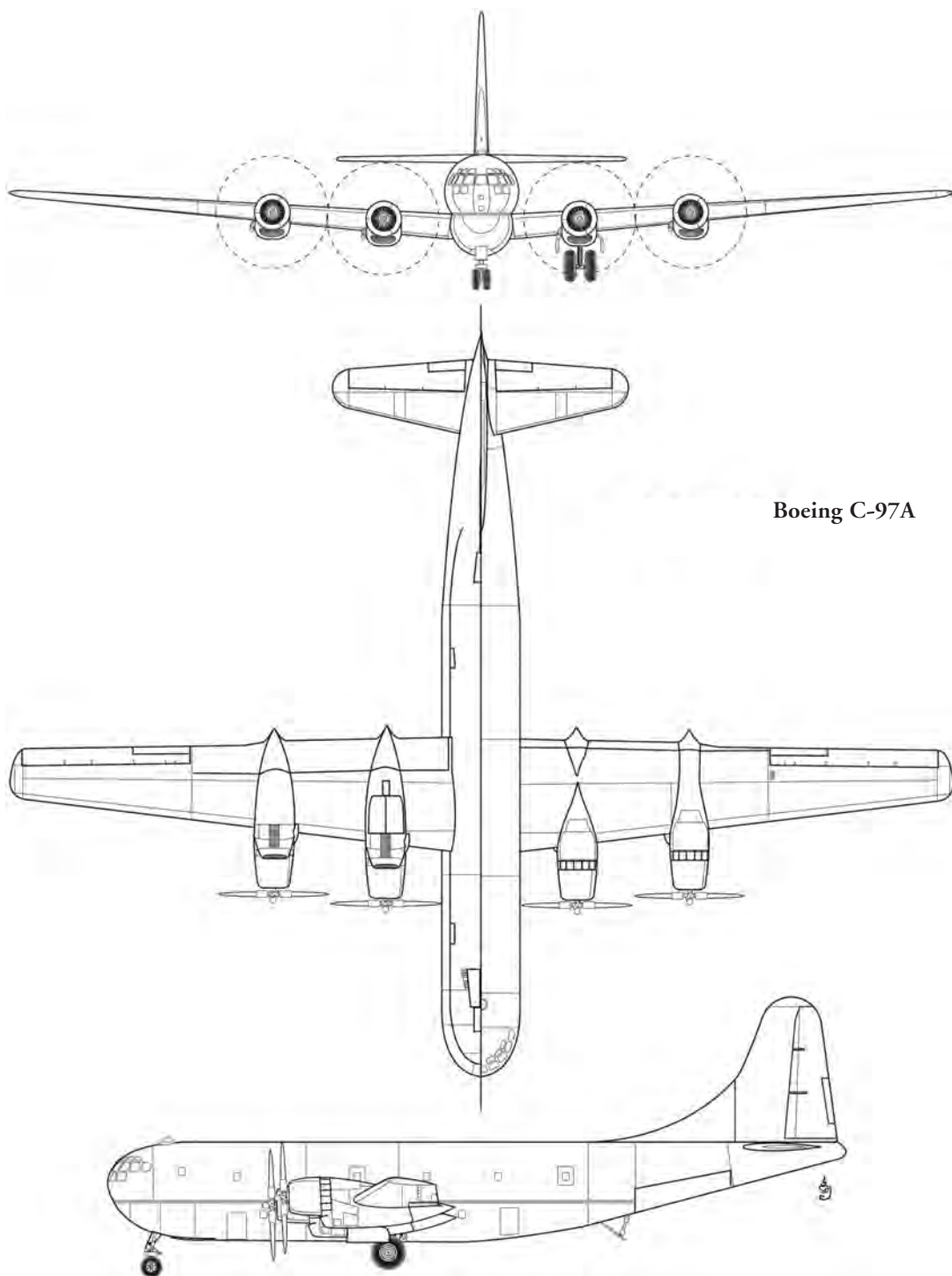
Weights: 82,500 lbs. empty, 120,000 lbs. loaded, 175,000 lbs. max takeoff.

Dimensions: Span 141 ft. 3 in., length 110 ft. 4 in., wing area 1,734 sq. ft.

In its aerial refueling role as the KC-97 “Stratotanker,” the Boeing Model 367 turned into one of the most important aircraft in the postwar USAF inventory. Its origins are traceable to 1942, when Boeing initiated work on a long-range transport based upon the aerodynamic design of the B-29 bomber, followed in early 1943 by an AAF contract to build three Model 367 proto-



One of three XC-97 prototypes undergoing service trials in 1945. The XC-97 shared the shorter fin of the B-29 and the same R-3350 engines.





**Main production transport version, the C-97A, seen in its heyday with MATS in 1950s. Operating from Japan during the Korean war, C-97s were first type of pressurized aircraft to be used for medical evacuation.**

types as the XC-97. Using the wings, engine nacelles, and tail group of the B-29, Boeing evolved a larger-diameter, circular-section fuselage that merged with B-29's lower fuselage to form a "double-bubble" cross-section. And similar to the B-29, a perfectly hemispherical nose section housed a flight deck surrounded by multiple panels of window glazing. To facilitate rapid loading of personnel, cargo, and vehicles, large clamshell doors were located in the rear fuselage together with a retractable ramp and built-in cargo hoist. From the start, the AAF envisaged C-97s as augmenting C-54s on ATC's long-distance logistical routes rather than supporting tactical operations in the field. The first XC-97 prototype, powered by the same 2,200-hp R-3350-41 engines as the B-29, completed its maiden flight from the Seattle plant on November 4, 1944.

In July 1945, while all three XC-97s were undergoing service trials, Boeing received an order for 10 production-test aircraft, six YC-97 cargo carriers, three YC-97As configured as troop carriers, and one YC-97B 80-seat passenger version, with deliveries scheduled to commence in mid-1947. In the intervening time, Boeing developed the B-50 for the AAF (an improvement of the B-29 powered by 3,500-hp R-4360 engines) and the Model 377 "Stratocruiser" for the airlines (essentially a C-97 airframe incorporating the B-50 improvements). As well as increasing available horsepower by 40 percent, the improvements introduced lighter but stronger airframe components fabricated from a new 75-S aluminum alloy, strengthened undercarriage to allow higher takeoff weights, increased fuel capacity and range, and enlarged vertical tail surfaces to offset the increased power. Thus, in March 1947, even before the production-test types had been delivered, the AAF (became USAF in September) awarded Boeing a contract for 27 aircraft

incorporating the B-50/Model 377 improvements as the C-97A (no experimental or service-test prototype), and 33 more were added to the order within a year. To enhance mission flexibility, the C-97A specification called for a convertible interior, accommodating either 134 fully equipped troops or a maximum cargo payload of 53,000 lbs. Dubbed “Stratofreighter” by the factory, production C-97As began entering USAF service in mid-1949.

Three C-97As held back for removal of the cargo doors and installation of the Boeing-invented “flying boom” aerial refueling system began testing in 1950 as KC-97A tankers. Although these three aircraft were later returned to a transport configuration, successful service evaluations led to production of 816 tanker variants between 1952 and 1956: 60 as the KC-97E, 159 as the KC-97F, and 592 as the KC-97G, all of which were convertible to transports. Four of the production-test types, three YC-97As and one YC-97B, were re-designated VC-97D in 1950 after being converted as command staff transports, and 14 C-97A production models modified for medical evacuation in 1951 became the C-97C.

As they arrived for service during early 1949, production-test YC-97s and -97As were assigned to SAC for strategic logistical support and as airborne command posts, with one SAC YC-97A arriving in Germany in time to participate in the last month of the Berlin Airlift. Production C-97As joined MATS from mid-1949 to mid-1950, in time to operate alongside C-54s and -74s in providing long-range logistical support for U.S. military forces during the Korean War. Adapted C-97As and later, specialized C-97Cs, operating regularly from Japan, were the first medical evacuation aircraft to be pressurized and carried four times the casualties of a C-54. C-97As continued in frontline service with transport divisions within MATS, flying logistical support missions worldwide, until they were replaced between 1958 and 1961 in favor of turboprop-powered Douglas C-133s. Following active USAF service, C-97As, along with KC-97E, F, and G tanker variants converted into transports, served with squadrons in 18 different ANG units from 1960 until 1972, when the final examples were retired.

## Boeing C-98 —1942

### Technical Specifications (C-98)

Type: Long-range passenger and cargo flying boat transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 5 (4 AAF; 1 USN)

Capacity: Crew of five plus 74 passengers or 33,995 lbs. of cargo.

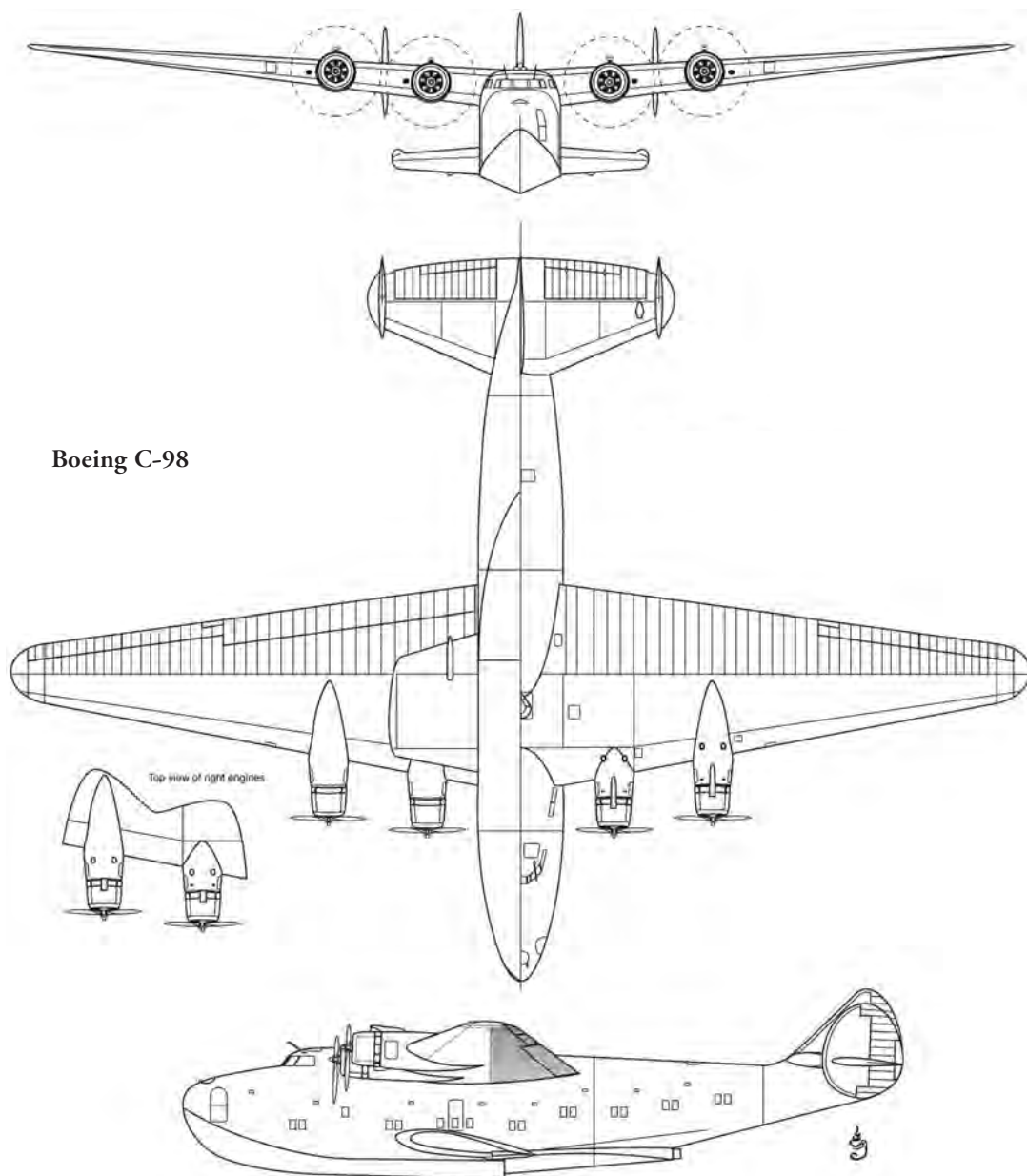
Powerplants: Four 1,600-hp Wright R-2600-3 *Twin Cyclone* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 199-mph, cruise 183-mph; ceiling 13,400 ft.; range 3,685 mi.

Weights: 50,268 lbs. empty, 82,500 lbs. max. takeoff.

Dimensions: Span 152 ft., length 106 ft., wing area 2,867 sq. ft.

The Boeing Model 314 *Dixie Clipper*, a four-engine flying boat operated by Pan American Airways, initiated the world’s first transatlantic passenger service on June 28, 1939. Much of the 314’s aerodynamic and structural design had been derived from Boeing’s one-of-a-kind XB-15 of 1937. Between early 1939 and mid-1941, Pan American took delivery of six 314s and three improved 314As, plus Boeing sold three more 314As to Britain for transoceanic service with British Overseas Airways Corporation (BOAC). In early 1942, soon after U.S. entry into World War II, five of Pan American’s 314s and 314As were impressed into U.S. military service. The four Model 314s/314As assigned to the AAF carried the designation C-98 but were flown by regular Pan American aircrews operating under overall Ferrying Command (later ATC) control. The C-98s saw extensive service on transoceanic routes, primarily in the Atlantic, ferrying



**Boeing C-98**

military personnel and VIPs, and the ex-*Dixie Clipper* was used to carry President Franklin D. Roosevelt to the Casablanca Conference in 1943. The ex-*Yankee Clipper* was written-off after a crash in 1943, while the remaining three C-98s were returned to Pan American control in late 1945.

*Naval Variants:* The single 314A, ex-*Cape Town Clipper*, assigned to the Navy, never received an official designation but apparently did possess a Bureau Number. Similar to the C-98s, this 314A was operated by Pan American aircrews under control of NATS, then returned to Pan American in late 1945.





**Clipper in war paint: one of four Boeing 314/314As assigned to the AAF for the duration of the war. The ex-Dixie Clipper carried President Roosevelt to the Casablanca Conference in 1943.**

### Convair C-99 —1947

Technical Specifications (XC-99)

Type: Long-range strategic airlift transport.

Manufacturer: Convair Aircraft Corp., San Diego, California.

Total military versions: 1 (USAF).

Capacity: Crew of five plus 400 troops or 100,000 lbs. of cargo.

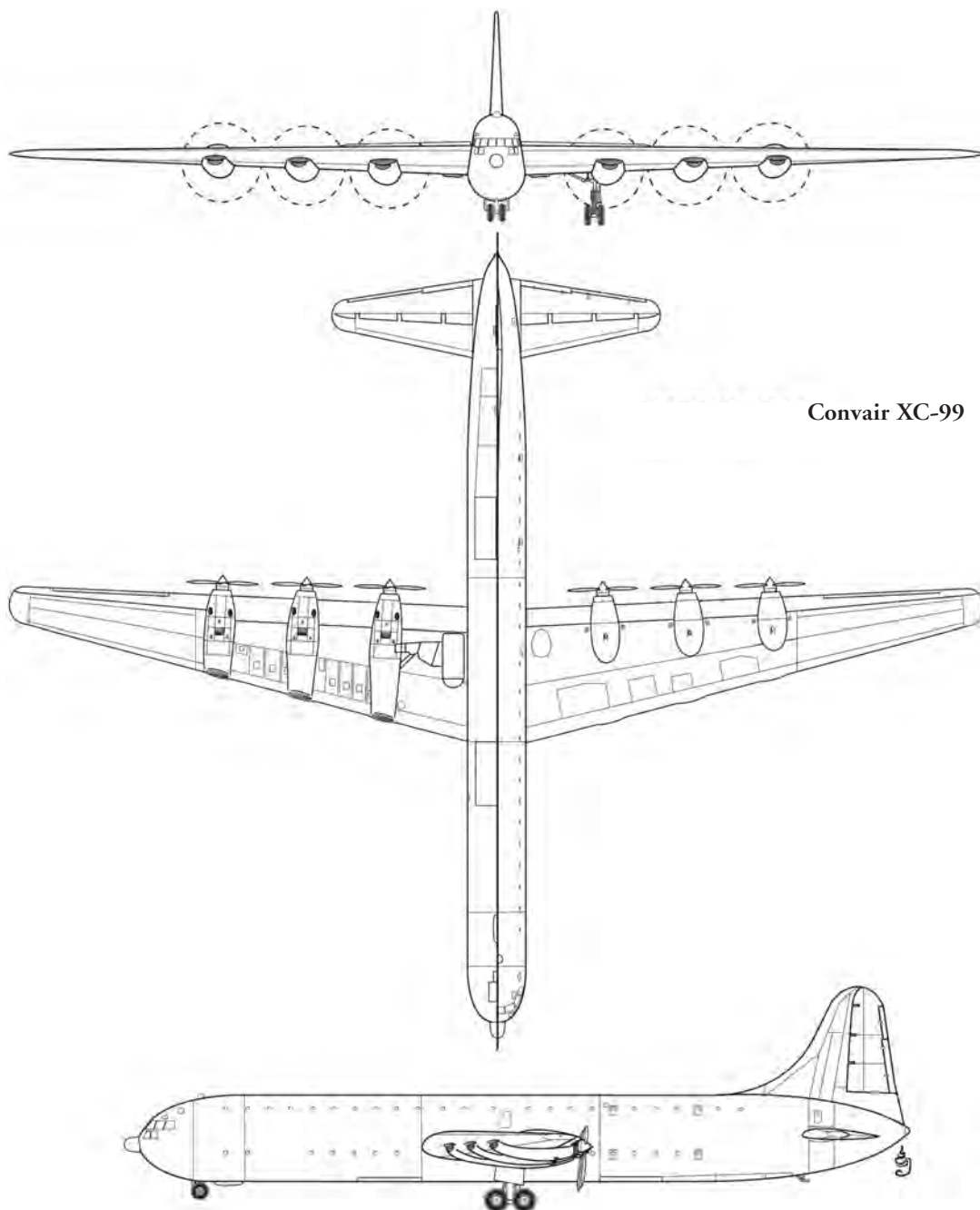
Powerplants: Six 3,500-hp Pratt & Whitney R-4360-41 *Wasp Major* 28-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 307-mph, cruise 240-mph; ceiling 29,500 ft.; range 8,100 mi.

Weights: 135,232 lbs. empty, 265,000 lbs. gross, 320,000 lbs. max. takeoff.

Dimensions: Span 230 ft., length 182 ft. 6 in., wing area 4,772 sq. ft.

In the darkest days of 1941, when the U.S. feared the possibility of being cutoff from bases outside the Western Hemisphere by victorious Axis forces, the AAF issued a requirement for an aircraft termed the “Intercontinental Bomber,” capable of flying 8,000 miles with 10,000 lbs. of bombs. Consolidated (became Convair in 1943) received one of the two development contracts awarded in late 1941 for its proposed Model 35 (later changed to Model 36), a six-engine pusher design, under the designation XB-36, then in 1942, under the assigned designation XC-99, the company was directed to design a transport variant that would utilize the same wing, powerplants, and empennage. The AAF authorized Consolidated to proceed with the detailed design of the XC-99 sometime in 1943, however, as with the XB-36 project, changing military priorities delayed actual construction to the extent that the war ended long before the XC-99 could be brought to completion, by which time the project was limited to one experimental prototype. Upon making its first flight on November 23, 1947, the XC-99, in terms of payload, was the largest landplane transport in the world. As originally built, the XC-99 featured the single-



Convair XC-99

wheel main landing gear of the XB-36, restricting operations to only a few runways capable of supporting the weight. To overcome this limitation, it underwent modifications to receive the four-wheel, bogie-type main gear developed for the YB-36A.

Following factory testing, the XC-99 was delivered to the USAF for acceptance trials that were concluded in late 1949. Due to other large, long-range transport types already in service or on order (i.e., C-74, C-97A, and C-124), the XC-99 never became a strong candidate for



Although authorized in 1943, the XC-99 did not make its first flight until late 1947. Never a candidate for production, the XC-99 performed logistical support for SAC until being retired in 1957.

production. Assigned to SAC for strategic logistical support, the XC-99 flew its first active service mission in July 1950, carrying a payload of 101,206 lbs. from Kelly AFB in Texas to McClelland AFB in California. Although occasionally used for other duties, the aircraft's primary job entailed hauling B-36 spares and components from Texas to California. After logging 7,400 hours of flying time, the XC-99 was retired from service in 1957. From the late 1950s to the mid-1990s, the aircraft was an outside exhibit open to the public at Kelly AFB, then in 2004, was disassembled and moved piece by piece to Wright-Patterson AFB in Ohio, where it is currently being restored by the USAF Museum as a future exhibit.

## Northrop UC-100—1942

Technical Specifications (UC-100)

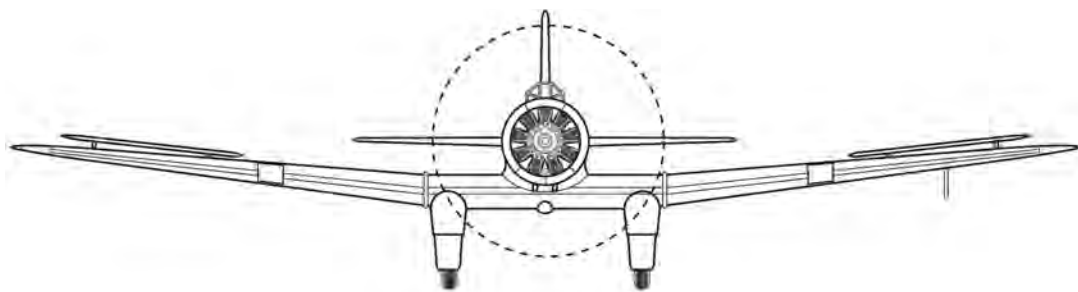
Type: Passenger and cargo utility transport.

Manufacturer: Northrop Corp. (subsidiary of Douglas Aircraft Corp.), Mines Field, California.

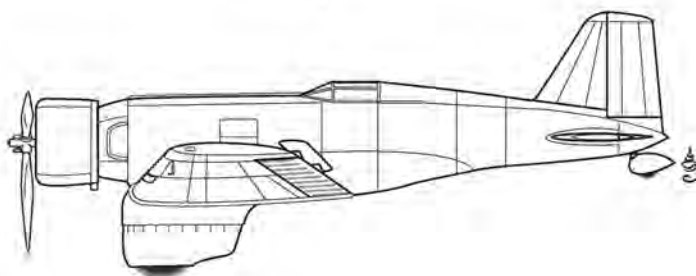
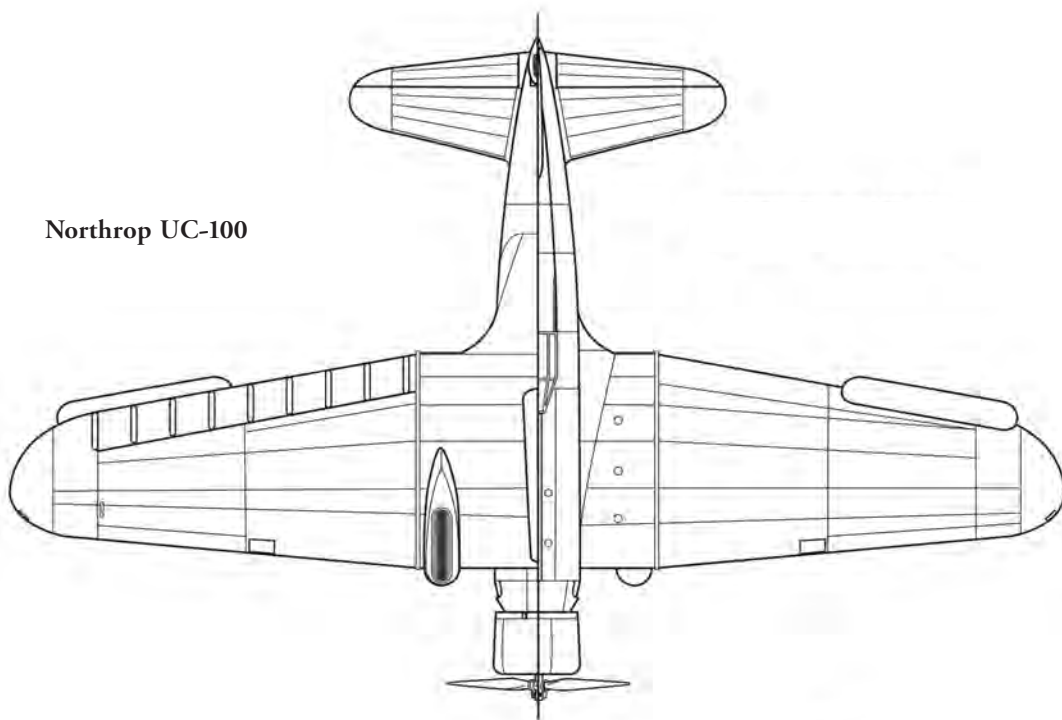
Total military versions: 1 (AAF).

Capacity: One pilot plus six passengers or 3,231 lbs. of cargo.

Powerplant: One 710-hp Wright R-1820F-53 *Cyclone* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard variable-pitch metal propeller.



**Northrop UC-100**



Performance: Max. speed 223-mph, cruise 204-mph; ceiling 23,400 ft.; range 1,970 mi.  
Weights: 4,119 lbs. empty, 7,350 lbs. loaded.  
Dimensions: Span 47 ft. 10 in., length 31 ft. 2 in., wing area 363 sq. ft.

Conceived as a high-speed civil transport and mail carrier, the “Gamma” appeared in 1932 as the first Northrop aircraft to be built after becoming a subsidiary of Douglas, and its advanced



**Photograph depicts Gamma 2D NR13758 in service with TWA as a flying testbed during the mid-1930s. This very same aircraft was later impressed into the AAF as the UC-100.**

all-metal construction and low-wing aerodynamic configuration formed much of the basis for the design of the Douglas DC-1 a year later. In 1934, Transcontinental and Western Airlines (TWA) purchased three Gamma 2Ds as single-seat mail and light cargo carriers. The second 2D built for TWA (NC13758) was subsequently equipped with de-icing boots, specialized radios, and a supercharged engine to be used as a flying testbed for high-altitude (20,000–35,000 ft.) operations. During World War II this aircraft was known to have been impressed into military service and given an AAF serial under the designation UC-100. Historical sources indicate the UC-100 was thereafter assigned to the U.S. Army Engineers in Africa but written-off after being damaged beyond repair.

### **Rearwin UC-102 Sportster —1942**

Technical Specifications (UC-102)

Type: Light utility transport.

Manufacturer: Rearwin Airplanes, Inc., Kansas City, Kansas.

Total military versions: 2 (AAF).

Capacity: One pilot plus one passenger.

Powerplant: One 90-hp Ken-Royce (LeBlond) R-351 7-cylinder air-cooled radial engine driving a two-bladed, fixed-pitch metal propeller.

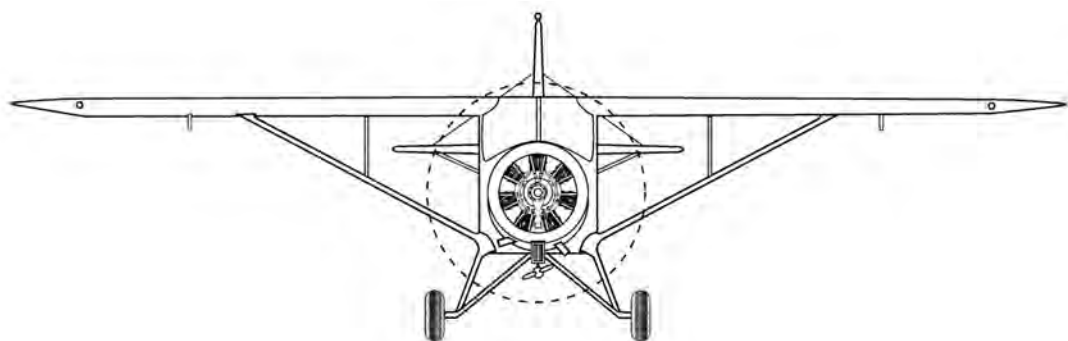
Performance: Max. speed 125-mph, cruise 115-mph; ceiling 14,800 ft.; range 500 mi.

Weights: 910 lbs. empty, 1,459 lbs. loaded.

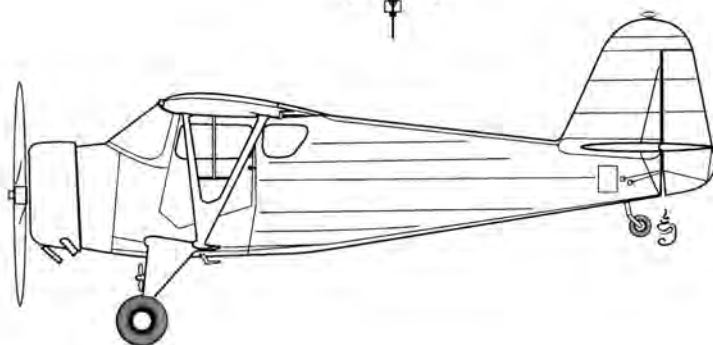
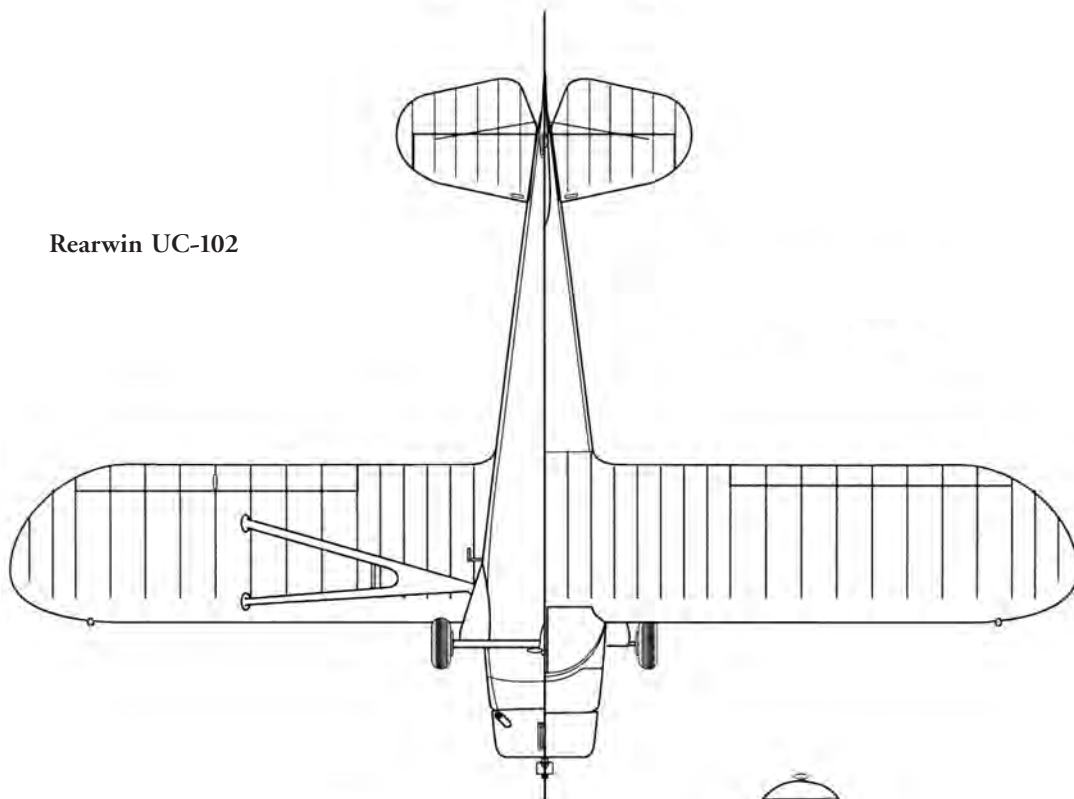
Dimensions: Span 35 ft., length 22 ft. 3 in., wing area 166 sq. ft.

Rearwin began marketing its Sportster series of two-place lightplanes in 1935, ultimately producing approximately 330 of them in a succession of models known as the 7000 (70-hp LeBlond), 8500 (85-hp LeBlond), 9000-L (90-hp LeBlond), 9000-KR (90-hp Ken Royce, for-





Rearwin UC-102







A civil Sportster 9000-KR, essentially identical to the two aircraft impressed into AAF service during 1942 as the UC-102.

merly LeBlond), and 9000-W (90-hp Warner *Scarab*). All Sportsters were high-wing monoplanes featuring a welded, steel tube fuselage and tail group, with built-up wooden wings, while the 9000 series could be distinguished by a close-fitting NACA cowl in place of a drag ring. In 1942, the AAF impressed two 9000-KR Sportsters as the UC-102, although one source indicated that one was designated UC-102A. No details on operational use and ultimate disposition of these aircraft are available.

### Grumman C/UC-103 —1942

Technical Specifications (UC-103 [G-32])

Type: VIP and training transport.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total military versions: 2 (AAF).

Capacity: One pilot plus one passenger or student.

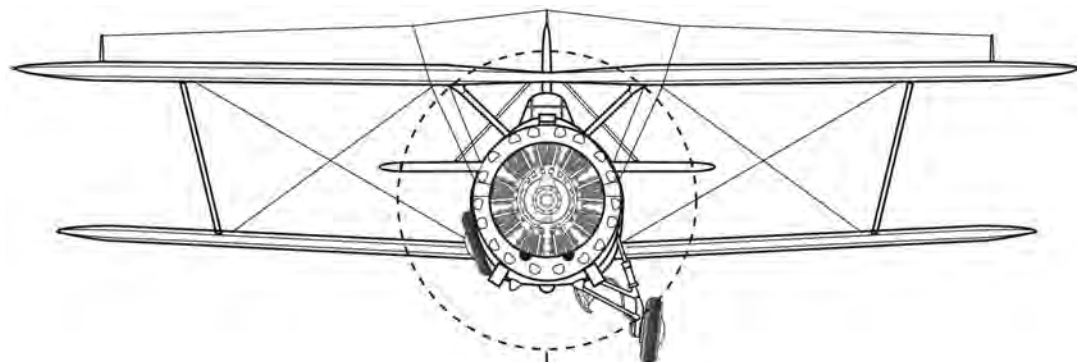
Powerplant: One 950-hp Wright R-1820G-5 *Cyclone* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 264-mph, cruise 150-mph; ceiling 30,000 ft.; range 800 mi.

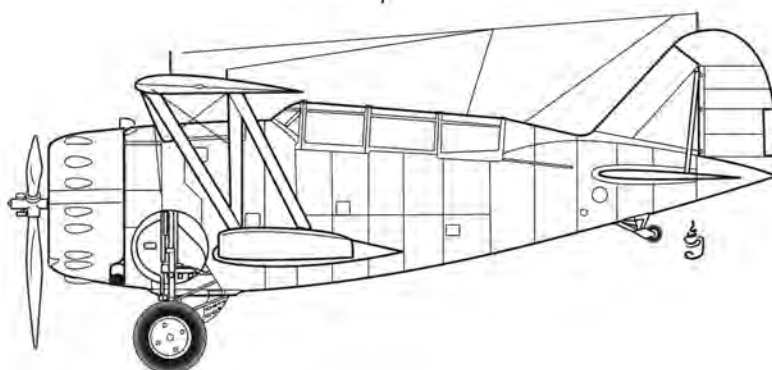
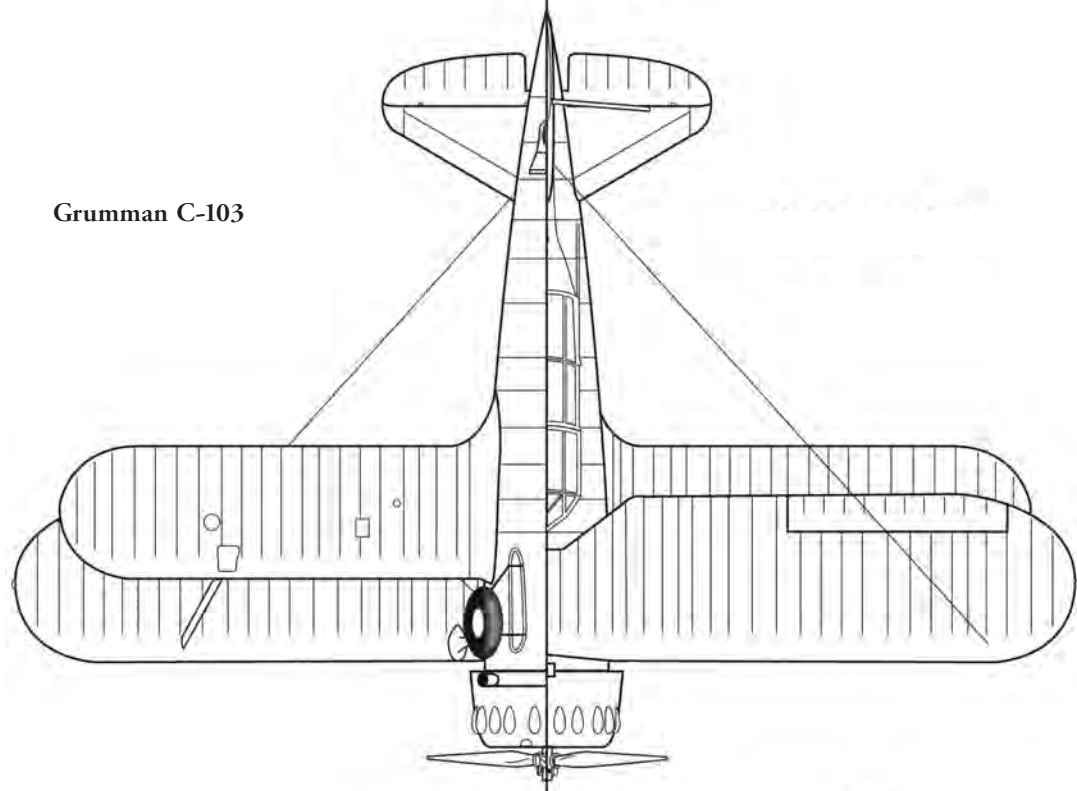
Weights: 3,580 lbs. empty, 5,000 lbs. loaded.

Dimensions: Span 32 ft., length 23 ft. 3 in., wing area 260 sq. ft.

Between 1936 and 1938, Grumman built three civil aircraft based upon the design of its Navy F3F biplane fighter, a single-seat G-22 Gulfhawk II and a two-seat G-32 Gulfhawk III, both purchased by Gulf Oil Co. for exhibition purposes, plus a two-seat G-32A retained by Grumman as a company aircraft. The G-32A differed from the G-32 in having a 775-hp engine



Grumman C-103





**Grumman G-32 Gulfhawk III seen before World War II while a company aircraft with Gulf Oil Co. Impressed into AAF service as the C/UC-103, initially as a VIP transport and later as a ferry pilot trainer.**

and split flaps. In late 1942 the G-32 and -32A were impressed into AAF service under the designation C-103 and later, UC-103. After being initially assigned to Bolling Field in Washington, D.C., as VIP transports, the UC-103s were transferred to the Caribbean Wing of Ferry Command at Homestead Field, Florida, where they were used from 1943 to 1945 to train pilots who ferried fighters. Both were removed from the inventory and sold surplus to civilian owners in early 1945. One was lost in the Everglades in 1948 and the other, after a crash in 1971, was totally rebuilt and returned to flying condition in 1993.

## Boeing C-105 —1943

Technical Specifications (XC-105 [XB-15])

Type: Long-range troop and cargo transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 1 (AAF).

Capacity: Crew of six plus unspecified number of troops or 27,350 lbs. of cargo.

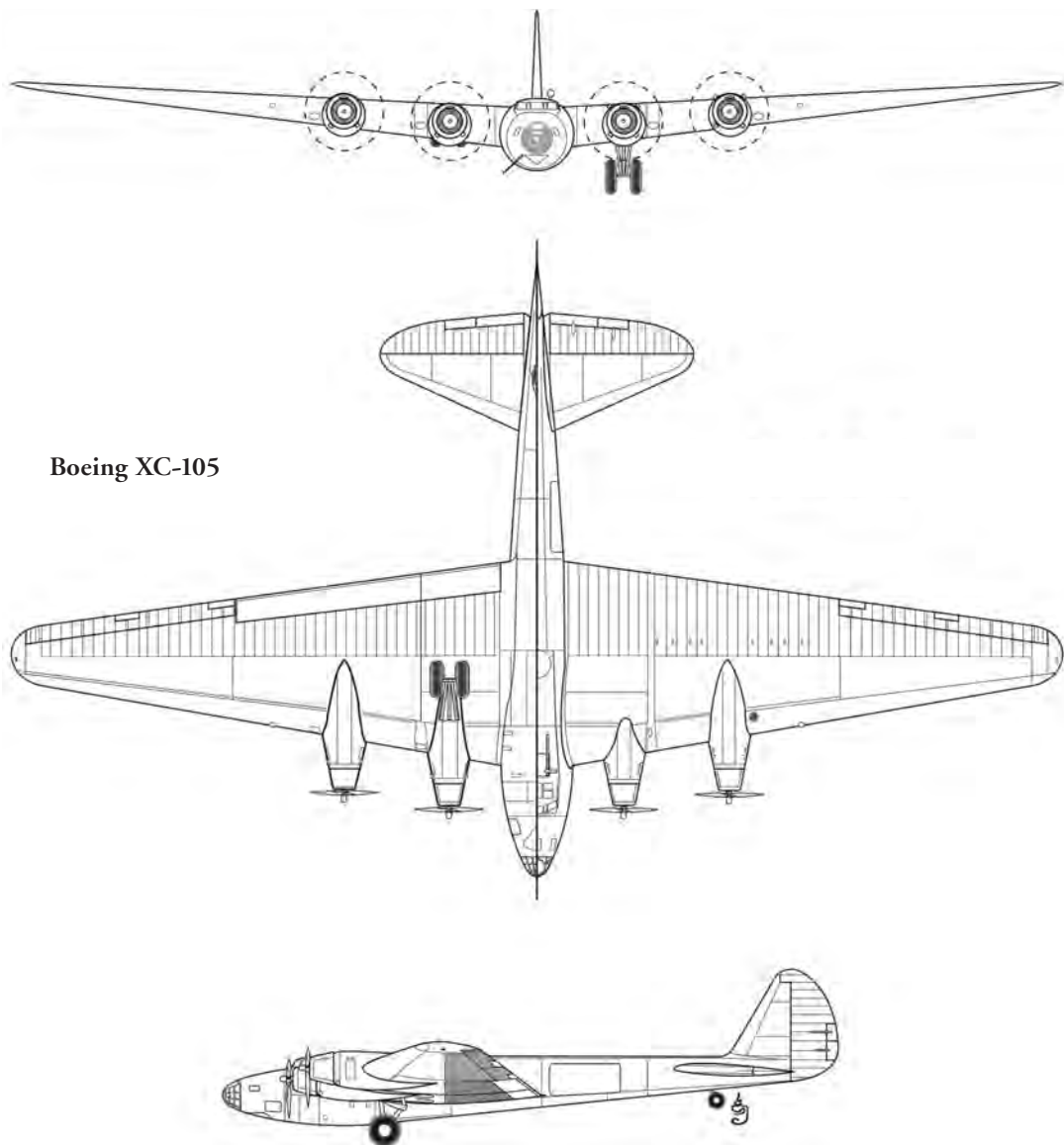
Powerplants: Four 1,000-hp Pratt & Whitney R-1830-11 *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard variable-pitch metal propellers.

Performance: Max. speed 197-mph, cruise 152-mph; ceiling 18,900 ft.; range 5,130 mi.

Weights: 37,309 lbs. empty, 65,068 lbs. gross, 70,706 lbs. max. takeoff.

Dimensions: Span 149 ft., length 87 ft. 7 in., wing area 2,780 sq. ft.

The Boeing Model 294, originally designated XBLR-1 (experimental bomber, long-range) but re-designated XB-15 in 1936 while still under construction, had been designed to test the



**Boeing XC-105**

“hemispheric defense” concept, which contemplated an aircraft that could deliver 2,000 lbs. of bombs from U.S. territories to targets within a 2,000-mile combat radius. However, due to the limited powerplant availability at that time, the XB-15, when flown in October 1937, proved to be woefully underpowered in terms of speed and rate-of-climb. Despite its shortcomings, the XB-15 gave Boeing valuable experience in the design and construction of the large aircraft it would be producing in the near future (e.g., Model 314, B-29, C-97). In 1943, after installation of an aft-mounted cargo door and an internal hoist, the XB-15 became a transport under the designation XC-105, with takeoff weight upped to 92,000 lbs. In its new role, the aircraft flew cargo, mail, and passengers on routes in the Caribbean until being scrapped at Kelly Field shortly before the war ended in 1945.



After being used as a “flying laboratory” for six years, the XB-15 was converted to a transport and re-designated XC-105 in 1943. It flew mail, passengers, and cargo in the Caribbean until being scrapped in mid-1945.

### Cessna C-106 —1943

Technical Specifications (C-106)

Type: Light cargo transport.

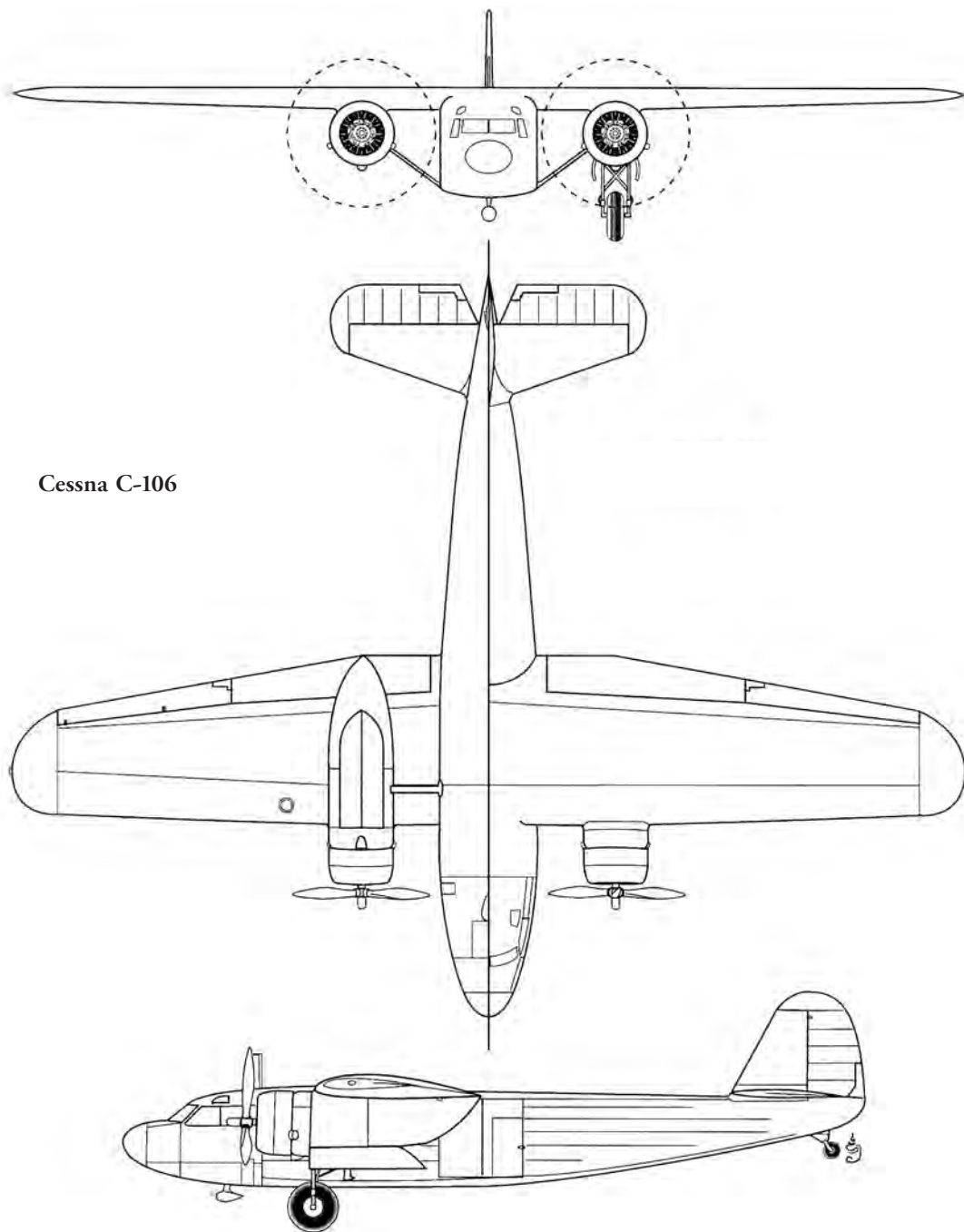
Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 2 (AAF).



Ancestry of XC-106 to the Bobcat and Airmaster is evident in this photo. Wartime shortages of plywood led to cancellation of the contract for 500 production aircraft.





**Cessna C-106**

Capacity: Crew of 4 plus 2,440 lbs. of cargo.

Powerplants: Two 600-hp Pratt & Whitney R-1340-S3H1 *Wasp* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard variable-pitch metal propellers.

Performance: Max. speed 195-mph; ceiling (not reported); range (not reported).

Weights: 9,800 lbs. empty, 14,800 lbs. loaded.

Dimensions: Span 64 ft. 8 in., length 51 ft. 1 in., wing area (not reported).



Apparently as a private venture, Cessna built two Model P-260 demonstrators in 1943 to be evaluated by the AAF for potential production as light, twin-engine transports under the assigned designations C-106 and -106A. Named “Loadmaster” by the company, the high-wing C-106 shared many of the aerodynamic and structural features of its C/UC-78 predecessor, with a fabric-covered airframe consisting of a tubular steel fuselage and built-up wooden wings and tail surfaces, along with more powerful R-1340-AN1 engines. The wing was semi-cantilevered, with struts supporting the center-section, and the main landing gear fully retracted into the underslung engine nacelles. The AAF showed sufficient interest in the C-106 to give Cessna a provisional order for 500; however, before the company could tool-up for production, the contract was canceled due to wartime shortages of plywood.

### Boeing C-108 and CB/VB-17 —1943

#### Technical Specifications (XC-108)

Type: Heavy bomber converted to VIP, cargo, or troop transport.

Manufacturer: Boeing Airplane Co., Seattle, Washington.

Total military versions: 37 (AAF/USAF).

Capacity: Crew of four plus 64 troops or 8,000 lbs. of cargo.

Powerplants: Four 1,200-hp Wright R-1820-65 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

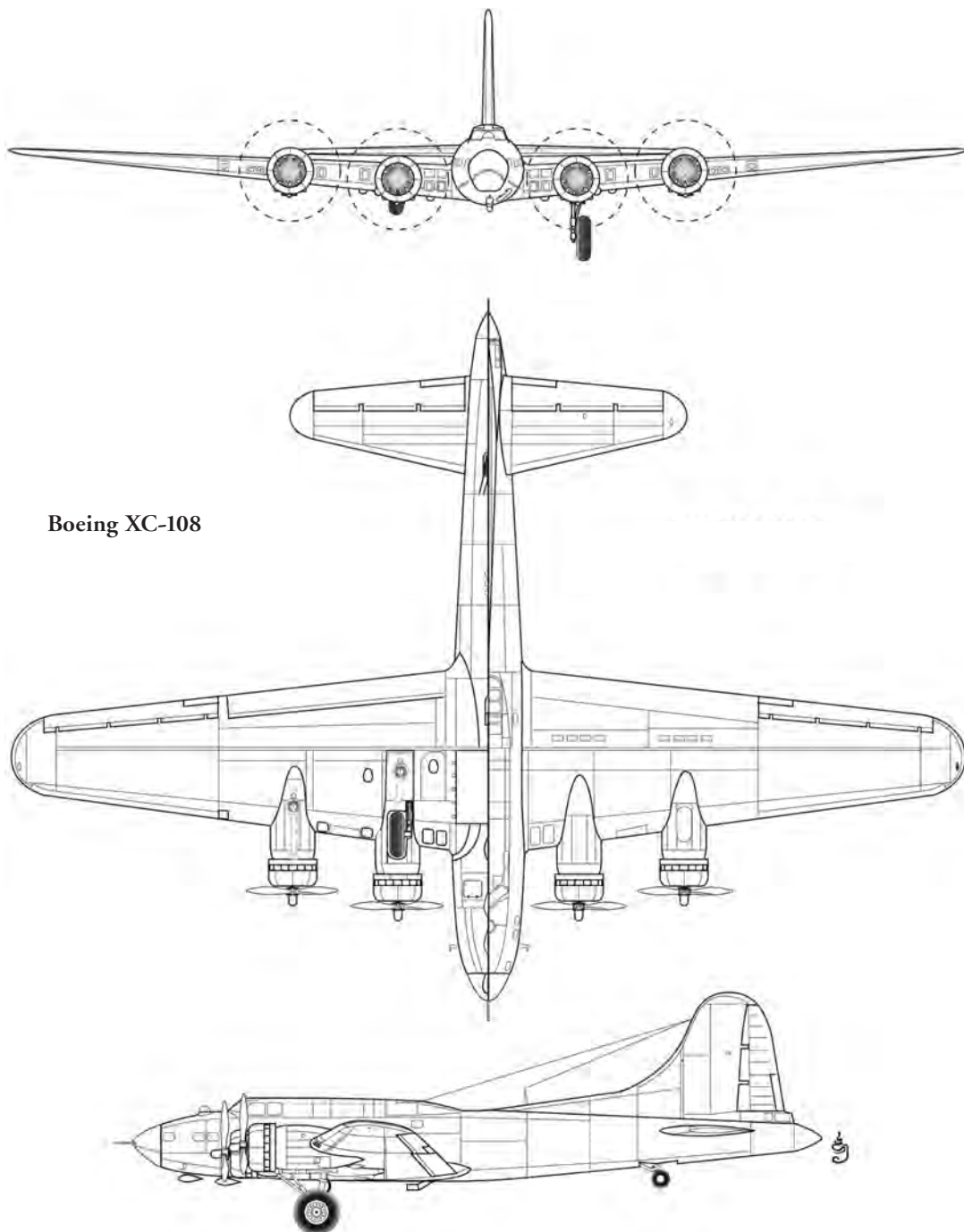
Performance: Max. speed 317-mph, cruise 195-mph; ceiling 36,600 ft.; range 3,300 mi.

Weights: 32,250 lbs. empty, 40,260 lbs. loaded, 53,000 lbs. max. takeoff.

Dimensions: Span 103 ft. 10 in., length 74 ft. 4 in., wing area 1,527 sq. ft.



The XC-108, General MacArthur’s first “Bataan,” was a stripped-down B-17E fitted with extra windows and seats. It was replaced by “Bataan II” in 1945, a new Douglas C-54.



**Boeing XC-108**

During the course of World War II, a number of B-17 bombers were re-designated following conversion into a transport configuration. The first, a B-17E, was re-designated XC-108 in 1943 after being stripped of bombing equipment, armor, and all guns, except for nose and tail positions, and fitted with extra windows and seats. After conversion, it served in Australia as General Douglas MacArthur's personal transport, and a B-17F subjected to a similar conversion for



VB-17G VIP transport, replete with curtains in the waist window, as seen at an air base open house during the 1950s. Note Boeing YB-52 on left in background.

MacArthur's staff became the YC-108. In early 1944, to evaluate the practicality of converting war-weary B-17s into transports, a B-17E based at Wright Field, Ohio, emerged as the XC-108A after being gutted of all combat gear from nose to tail and fitted with a hinged nose cap and cargo door. However, the conversion program was abandoned after test flights over the Himalayas revealed persistent engine problems resulting from high-altitude operations. Actual field-testing in India of the XC-108B — a B-17F converted into a fuel tanker — was likewise unsuccessful.

Authorities differ on the exact number of B-17Gs converted into CB-17G 64-seat troop transports (as many as 25) and VB-17G VIP transports (as many as eight). A few VB-17Gs are known to have served in the postwar USAF, with the very last example not being retired until 1956.

## North American CB/VB-25 — 1942

Technical Specifications (CB-25J)

Type: Medium bomber converted to utility or VIP transport.

Manufacturer: North American Aviation, Inc., Inglewood, California.

Total military versions: Unknown (AAF/USAF).

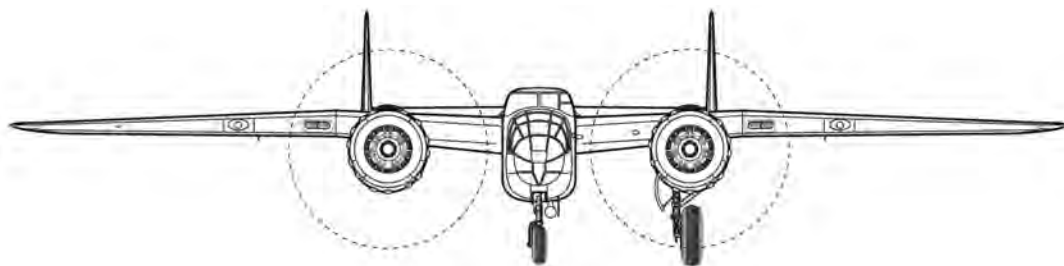
Capacity: Crew of four plus unspecified number of passengers or 3,000 lbs. of cargo.

Powerplants: Two 1,700-hp Wright R-2600-29 *Twin Cyclone* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

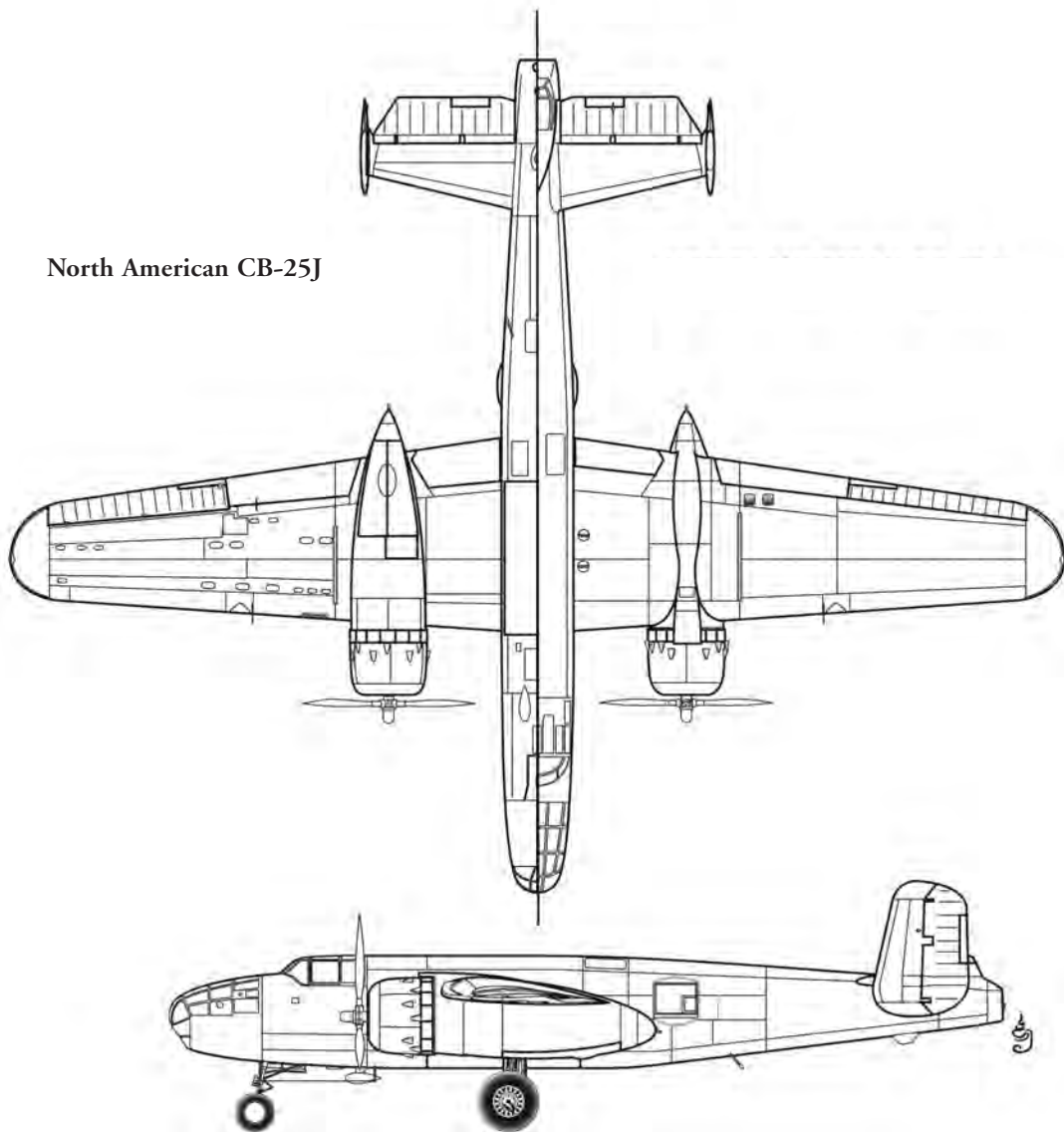
Performance: Max. speed 293-mph, cruise 242-mph; ceiling 24,500 ft.; range 3,420 mi.

Weights: 19,490 lbs. empty, 27,560 lbs. loaded, 33,400 lbs. max. takeoff.

Dimensions: Span 67 ft. 7 in., length 53 ft. 6 in., wing area 610 sq. ft.



North American CB-25J





**A CB-25J utility transport serving with MATS, probably in the late 1940s. Most had seen use as TB-25J crew trainers.**

Like the B-17, a number of North American B-25s underwent conversion into utility and VIP transports from 1942 onwards. The first, one of the earliest B-25s, became AAF Chief Gen. H. H. Arnold's personal transport during 1942 after being stripped of armament and refitted with an executive interior but retained its original designation. Likewise, a B-25J converted in 1944 served as the personal aircraft of ETO commander Gen. Dwight Eisenhower, with no change in designation. After World War II, the B-25J was the only variant to be retained for active service in the postwar AAF and USAF, and most (1,000+) underwent trainer conversions as the TB-25J, K, L, M, and N for multi-engine pilot and aircrew training. It appears that a number of TB-25Js, the most abundant postwar variant, were simply re-designated as CB-25J utility transports or VB-25J staff transports when they were assigned those duties, although the staff version may have been fitted with extra seats. Also, one or more TB-25Ns became VB-25N staff transports following release from trainer duties. While some TB-25Js are known to have served in ANG units during the 1950s, historical records do not indicate whether any were used as transports. The very last USAF VB-25J was withdrawn from service in late 1959.

## **Douglas VB-26 —1958**

Technical Specifications (VB-25B)

Type: Light bomber converted to VIP transport.

Manufacturer: Douglas Aircraft Corp., El Segundo, California.

Total military versions: Unknown (ANG).

Capacity: Crew of two plus an unspecified number of passenger accommodations.

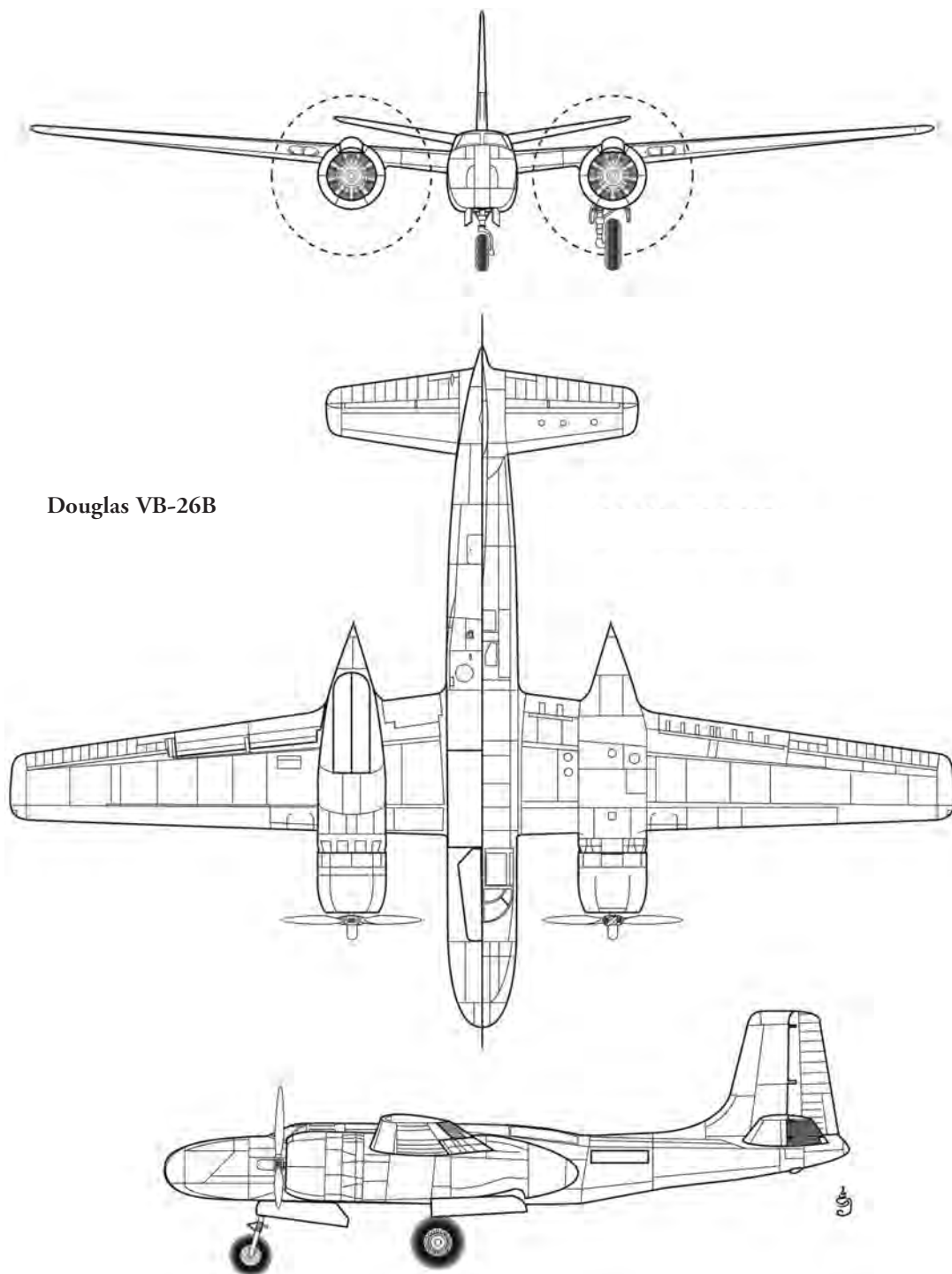
Powerplants: Two 2,000-hp Pratt & Whitney R-2800-79 *Double Wasp* 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 371-mph, cruise 230-mph; ceiling 21,800 ft.; range 3,354 mi.

Weights: 22,362 lbs. empty, 35,000 lbs. loaded, 40,015 lbs. max. takeoff.

Dimensions: Span 70 ft., length 50 ft., wing area 540 sq. ft.





Douglas VB-26B





**VB-26B, an ex-TB-26B, seen in service with the National Guard Bureau as an administrative staff transport. Last example retired in 1972.**

The Douglas A-26 (became B-26 in 1948) “Invader” served with the AAF and USAF in a tactical role from 1944 to 1969, seeing combat in three wars — World War II, Korea, and Vietnam. ANG units began receiving A/B-26s as early as 1946 but picked-up many more both during and after the Korean War (1950–1953) once they were released from active USAF units. During the mid-1950s, as they were replaced in tactical units by newer aircraft, some ANG B-26Bs/Cs were stripped of armament and re-designated TB-26B/C multi-engine and aircrew trainers. When the trainer variants were withdrawn in 1958, several continued in service with the ANG administrative branch as VB-26B VIP transports, the last example of which was not retired until 1972.

## **C-110 (see Douglas R3D in Part B)**

### **Lockheed C-111 (R4O)—1938**

#### **Technical Specifications (C-111)**

Type: Passenger and cargo transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions: 5 (4 AAF; 1 USN).

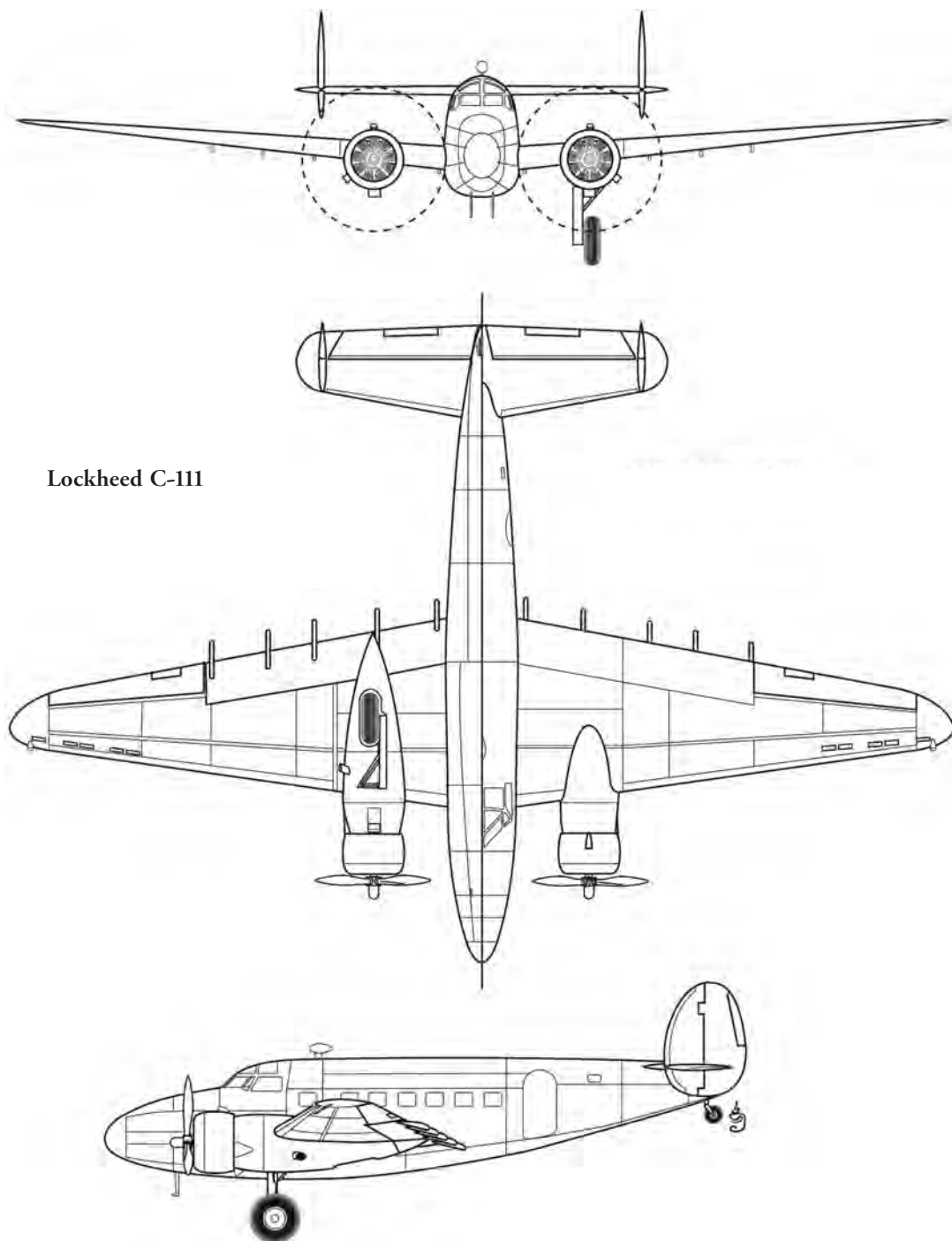
Capacity: Crew of two plus 12 passengers or 6,800 lbs. of cargo.

Powerplants: Two 900-hp Wright R-1820-F62 *Cyclone* 9-cylinder air-cooled engines driving three-bladed Hamilton Standard constant-speed propellers.

Performance: Max. speed 250-mph, cruise 215-mph; ceiling 24,500 ft.; range 2,125 mi.

Weights: 10,750 lbs. empty, 15,650 lbs. loaded, 17,500 lbs. max. takeoff.

Dimensions: Span 65 ft. 6 in., length 44 ft. 4 in., wing area 551 sq. ft.



Lockheed C-111



**The only Model 14 ordered by a military branch, this XR4O-1 was procured by the Navy in 1938 to serve as a fast staff transport at NAS Anacostia, Maryland.**

The Lockheed Model 14 “Super Electra” initially entered service as a 12-passenger airliner in September 1937 as an improved follow-up to the earlier Model 10 Electra (see C-36 and -37, above). The design was characterized by a very streamlined elliptical-section fuselage, sharply tapered wings, and a twin-fin empennage. Innovative features included a system of tracked Fowler-type trailing-edge flaps and fixed leading-edge slots that reduced landing speed to the 70-mph range. The first of many militarized export versions began entering service with RAF Coastal Command during 1939 as the *Hudson I*. In early 1942 four Dutch-registered Model 14WF52s, flown into Australia to avoid capture by the Japanese, were acquired locally by the AAF under the designation C-111. One was destroyed almost immediately in a crash while the other three C-111s were employed by the Allied Directorate of Air Transport in Australia for the duration of the war.

*Naval Variants:* In 1938 the Navy acquired a single off-the-shelf civil Model 14H2 (Pratt & Whitney R-1690-52 *Hornet* engines) under the designation XR4O-1. The aircraft was thereafter assigned to NAS Anacostia as a fast VIP transport where it served both before and during World War II.

## Douglas C-112 and C-118 (R6D)—1947

Technical Specifications (C-118A)

Type: Long-range strategic airlift transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California

Total military versions: 167 (102 USAF; 65 USN).

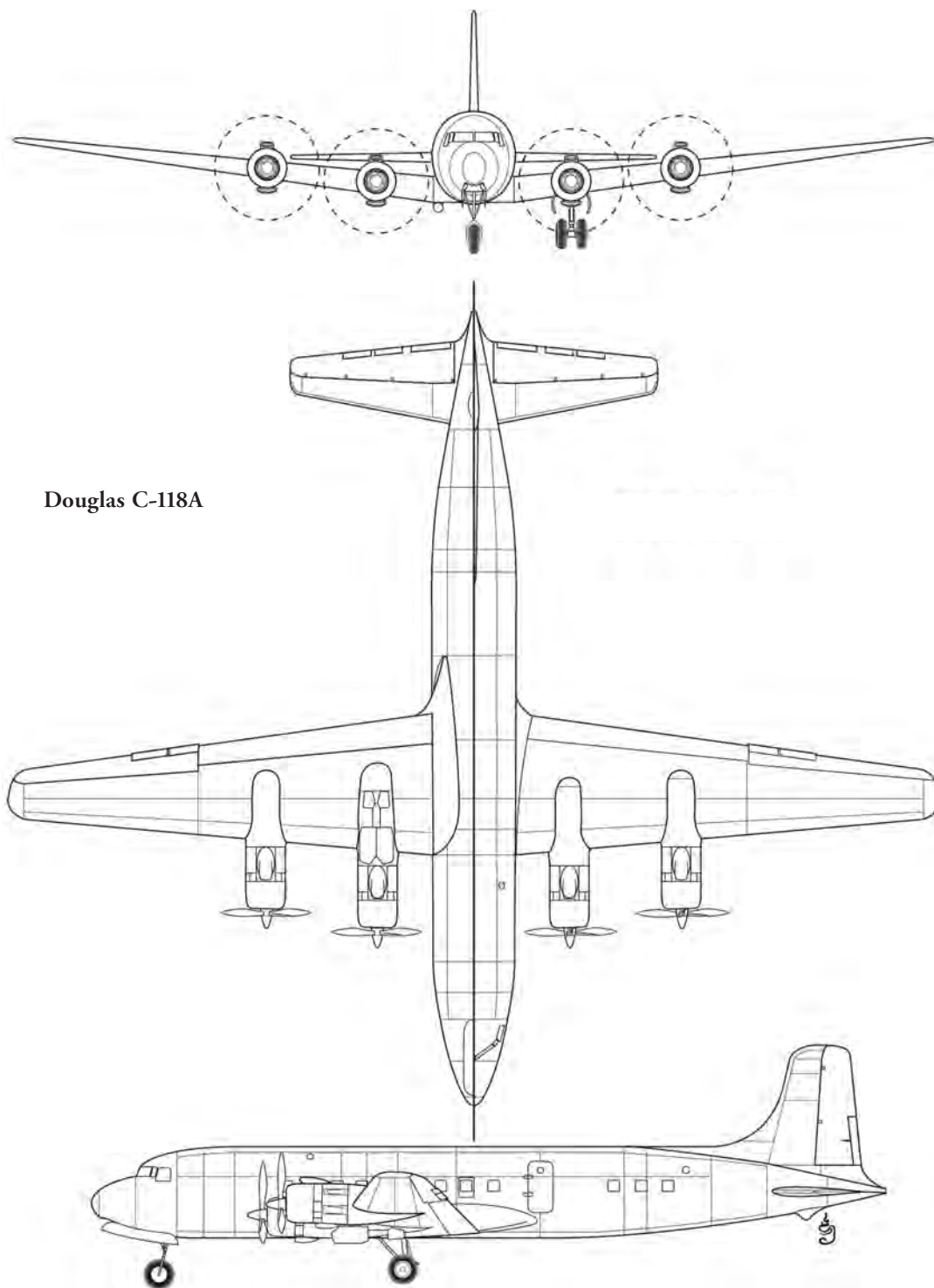
Capacity: Crew of four or five plus 74 troops or 28,200 lbs. of cargo.

Powerplants: Four 2,400-hp Pratt & Whitney R-2800-CB16 *Double Wasp* 18-cylinder air-cooled engines driving three-bladed Hamilton Standard constant-speed propellers.

Performance: Max. speed 308-mph; cruise 265-mph; ceiling 27,200 ft.; range 2,990 mi.

Weights: 55,358 lbs. empty, 107,000 lbs. max. takeoff.

Dimensions: Span 117 ft. 6 in., length 106 ft. 9 in., wing area 1,463 sq. ft.





One of 101 C-118As delivered to the USAF between 1951 and 1952, the photograph depicting an example that served with the Atlantic Division of MATS.

Design work on what became the well-known Douglas DC-6 commercial airliner began during World War II as an AAF requirement to develop an R-2800-powered, pressurized version of the C-54B under the designation XC-112. Since useful load would almost be doubled by the increase in power, Douglas added a seven-foot nine-inch stretch to the fuselage but retained the general wing layout of the C-54. The project was reclassified as the XC-112A, but in the wake of the V-J Day military reductions, the AAF canceled the contract before a prototype had been built. But Douglas, with airline orders already pending, moved ahead and flew the completed prototype on February 15, 1946 as the civil DC-6, with the first production aircraft reaching airline service by the middle of the year. With a customized executive interior, under the designation VC-118, the 29th DC-6 on the production line became the first military variant when taken into AAF (USAF a few months later) service in mid-1947 as “Independence,” President Truman’s official transport, and served until early 1953.

With the advent of more powerful water-methanol injection CBI6 engines, Douglas introduced the all-freight DC-6A “Liftmaster” in late 1949, featuring a five-foot fuselage stretch, reinforced floor, forward and aft cargo doors, and no side windows, followed in 1951 by the similar DC-6B accommodating up to 102 passengers. Douglas received its first quantity military order in 1950 for 166 DC-6As, 101 to the USAF as the C-118A, plus 65 to the Navy as the R6D-1. C-118As differed from DC-6As in having the square side windows of the DC-6/6B so they could





**Navy C-118B (previously R6D-1) seen while operating with VR-24 after release from MATS in 1966. Final Navy C-118Bs were not retired from the reserves until 1981.**

be readily converted to a passenger or staff transport configuration, and some C-118As were redesignated VC-118A after being retrofitted with VIP interiors. A number of C-118As were also converted to carry medical litters for evacuation of wounded but apparently never received an MC prefix. During military service, all C-118As received nose radomes for weather radar.

As they arrived for duty during 1951 and 1952, most USAF C-118As were assigned to one of the three MATS Divisions for long-distance strategic logistics support. The type played a key role in "Operation Safe Haven" from 1956 to 1957 when approximately 14,000 Hungarian refugees were airlifted to the continental U.S. MATS C-118As participated in emergency support of Lebanon in 1958 and Chile in 1960, after that nation had been devastated by earthquakes and tidal waves. Also in 1960, C-118As (with C-124s) played a major role in the strategic mobility exercise "Big Slam/Puerto Pine," airlifting division-sized units of Army troops and material from 14 U.S. bases to Puerto Rico and back. In Southeast Asia from 1965 to 1967, C-118As fitted with medical litters evacuated wounded U.S. military personnel from Vietnam to Clark AFB, Philippines. When MATS was deactivated in December 1965, its remaining C-118As were absorbed into the newly created Military Airlift Command (MAC). The phase-out of C-118As from the USAF's strategic logistics support role began in the mid-1960s as Boeing C-135s and Lockheed C-141s arrived to take their place; however, a smaller number of VC-118As continued as staff and VIP transports, with the last example not being retired until 1975.

*Naval Variants:* As the 96 R6D-1s procured by the Navy reached service in 1951 and 1952, most of them operated under MATS control in the strategic logistics support role alongside USAF C-118As until 1962. Four subsequently fitted with passenger interiors were earmarked as staff and VIP transports under the designation R6D-1Z. When the tri-service designation scheme took effect in late 1962, Navy R6Ds became C/VC-118Bs. From 1962 onwards, after Navy withdrawal from MATS, its C-118Bs served in Fleet Tactical Support with VR-1 out of NAS Norfolk, Virginia and VR-21 out of NAS Barbers Point, Hawaii, and VR-24 detachments in Europe and



North Africa. During the Vietnam War (1965–1972), a detachment of VR-21 C-118Bs provided logistical support to Navy and Marine combat operations in Southeast Asia. In 1972 the Navy's remaining C-118Bs were transferred to Fleet Logistics Support reserve squadron VR-54 at NAS New Orleans, Louisiana, and served until the unit was deactivated in early 1981.

## C-117 (see Douglas R4D-8 in Part B)

### Fairchild C-119 (R4Q)—1947

Technical Specifications (C-119C [C-119G])

Type: Tactical transport.

Manufacturer: Fairchild Engine & Aircraft Corp., Hagerstown, Maryland, and Kaiser Motor Corp., Ypsilanti, Michigan.

Total military versions: 1,183 (1,051 USAF/ANG; 97 USMC), plus 35 exported.

Capacity: Crew of five plus 62 troops, 35 medical litters, or 10,000 lbs. of cargo.

Power plant: Two 3,500-hp Pratt & Whitney R-4360-20 *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Hamilton Standard constant-speed propellers [3,500-hp Wright R-3350-85 *Dou-ble Cyclone* 18-cylinder air-cooled radial engines driving four-bladed Aeroproducts constant-speed propellers].

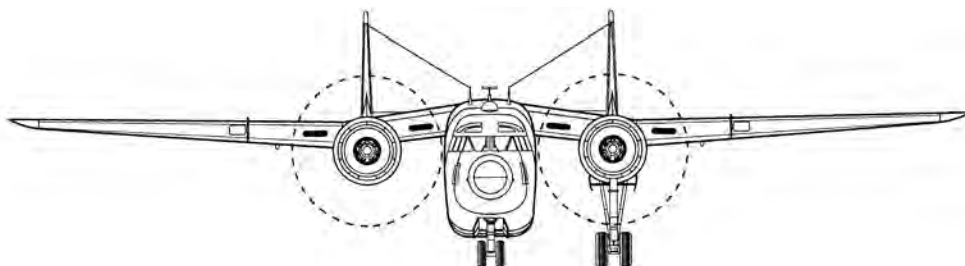
Performance (note: data for C and G are the same): Max. speed 281-mph, cruise 200-mph; ceiling 23,900 ft.; range 2,290 mi.

Weights: 40,000 lbs. [39,800 lbs.] empty, 64,000 lbs. loaded, 74,000 lbs. max. takeoff.

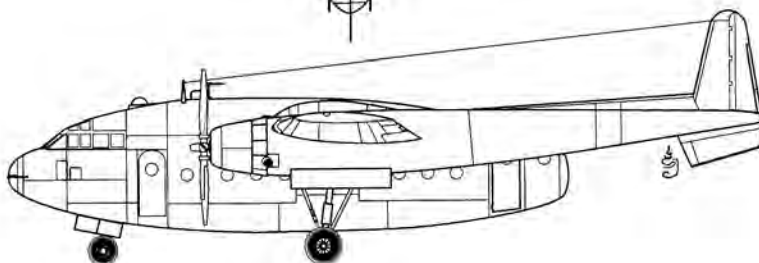
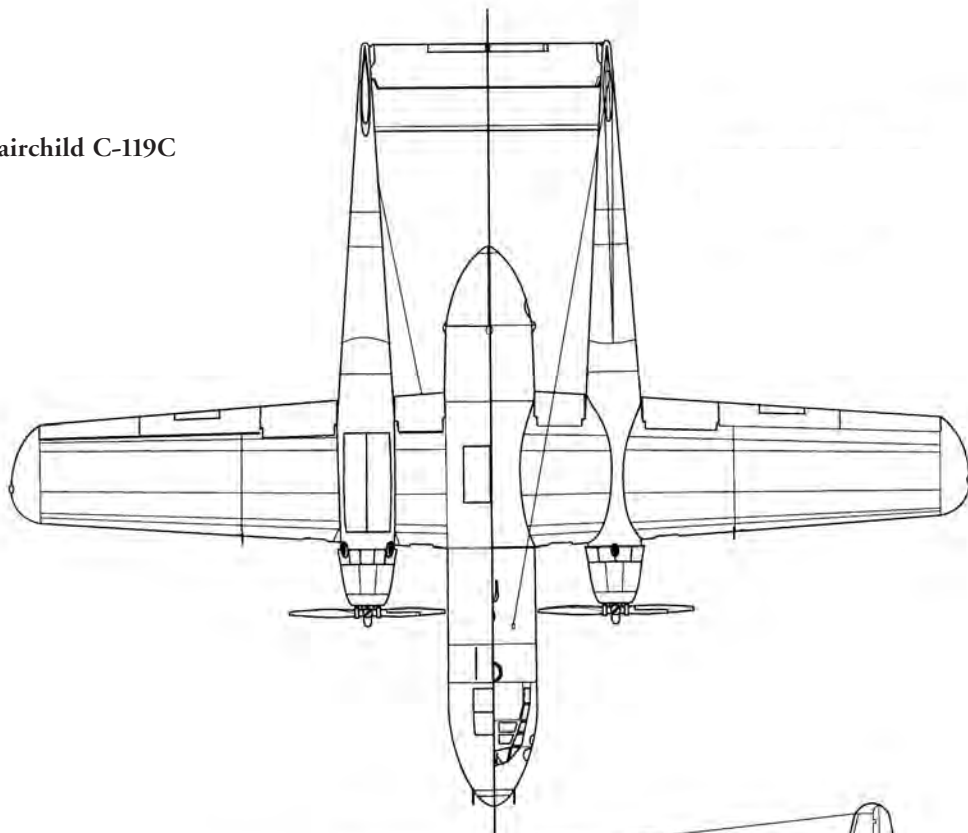
Dimensions: Span 109 ft. 3 in., length 86 ft. 8 in., wing area 1,447 sq. ft.

In order to address the operational shortcomings of the C-82, Fairchild commenced a redesign effort in 1946 under the designation XC-82B. Besides the obvious need for more powerful engines and general airframe strengthening, engineering changes included widening the fuselage to allow easier handling of equipment and relocating the cockpit forward, flush with the nose, to create more usable cargo space. The revisions to the basic C-82 airframe were sufficiently extensive that by the time the prototype flew in November 1947, Air Material Command changed its designation to XC-119A. The new type still carried the official name "Packet" but in service would be known as the "Flying Boxcar."

After official USAF acceptance, Fairchild received a series of production contracts, starting with 55 C-119Bs delivered from late 1949 to mid-1950. Bs differed from the prototype in having dual-wheel landing gear, no ventral fin extensions, four-bladed, reversible-pitch propellers, an overhead monorail delivery system, and LORAN (long range) navigation equipment. The first of 303 C-119Cs, with dorsal fillets that added boom strength and directional stability, began arriving for service in late 1950. Versions having a three-wheeled landing gear and removable cargo pod were projected as the YC-119D (R-4360 engines) and YC-119E (R-3350 engines), then re-designated XC-128A/B, but never built. In 1951, while C-119C production was ongoing, the USAF gave Kaiser Motor Corp. a contract to assemble 238 airframes from parts for a new C-119F variant to be powered by 3,500-hp Wright R-3350-85 engines, but as events transpired, Kaiser only delivered 71 examples in 1952 and 1953, with the remaining 167 completed by Fairchild. In the same timeframe, Fairchild delivered 35 more C-119Fs to the RCAF. Comparatively, flight performance of the F was almost identical to that of the C, with a very slight increase in useful load. The Fs were followed from 1953 to 1955 by delivery of 484 similar C-119Gs which differed in having Aeroproducts propellers in place of Hamilton Standards. Unusually high C-119 accident rates attributed to engine and propeller operations, combined with instability at low airspeeds, led to a number of modifications such as ventral fin extensions and redesigned propeller regulators.



Fairchild C-119C



Fairchild sought to correct the ongoing deficiencies of the C-119 with the XC-119H “Skyvan,” introduced in 1952. Changes included wingspan extended to 148 feet, a fuselage stretched to 95 feet 8 inches, and significantly enlarged tail surfaces. All fuel was carried in external wing tanks. With the same R-3350 engines of the G, these improvements yielded a 20 percent increase in range, greater cargo capacity, doubled payload, plus excellent low-speed/short-field handling characteristics; however, Air Material Command was by this time refocusing efforts upon devel-



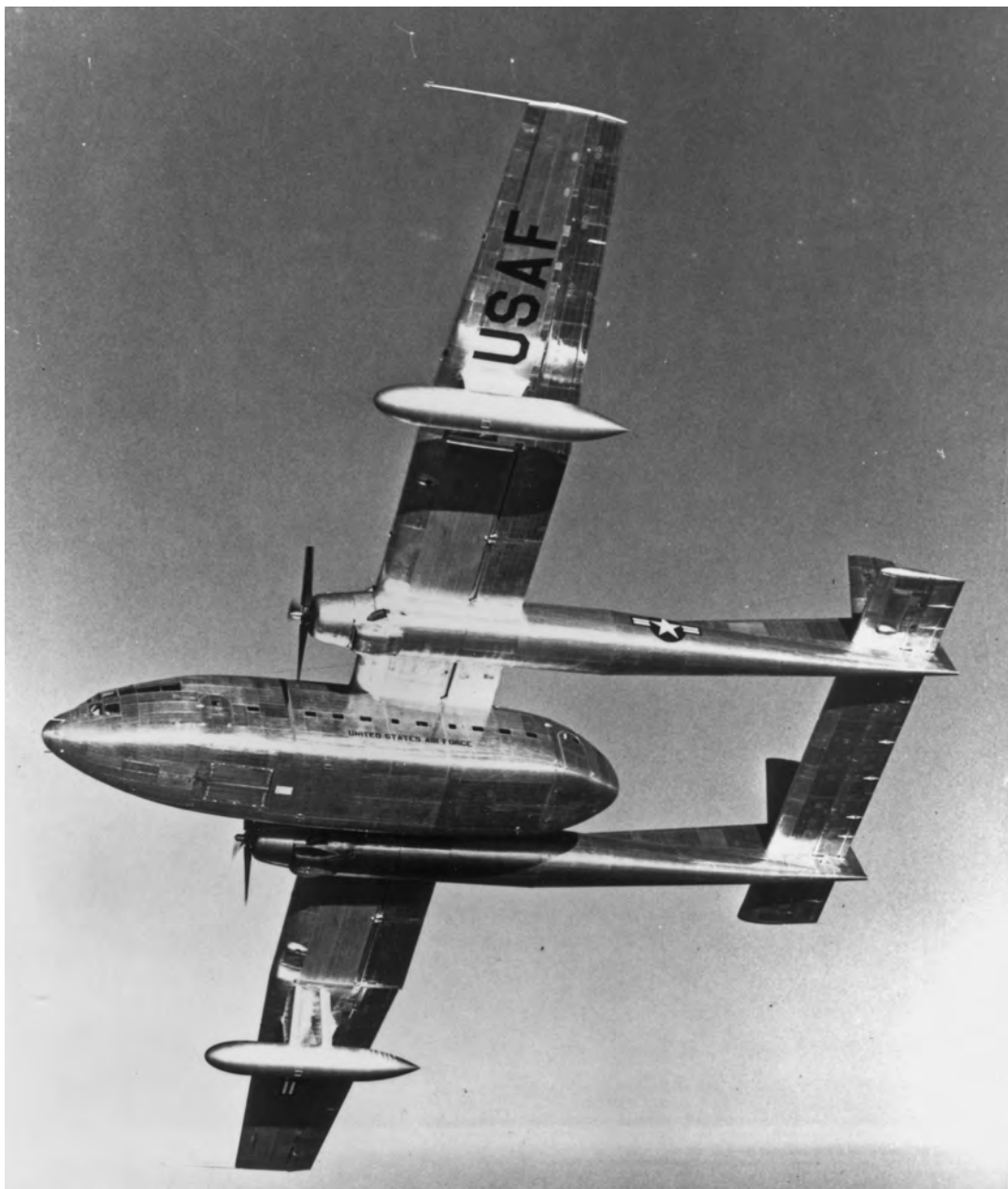
The 303 C-119Cs delivered in 1950 and 1951 featured a dorsal fin fillet and strengthened booms. C-119s replaced C-46s, C-47s, and C-82s in troops carrier units just as soon as they could be delivered.



Marine R4Q-1 (same as C-119B) seen while serving with VMR-253. This example is seen in the mid-1950s after the ventral fins were added.

opment of new tactical transport designs like the Chase (later Fairchild) XC-123 and the forthcoming Lockheed YC-130, with the XC-119H program ultimately being limited to one prototype.

Over the course of their service careers, many C-119s underwent modifications that resulted in designation changes: in 1956, 62 C-119Fs and Gs became the C-119J after receiving a “beaver



By the time the extensively modified XC-119H “Skyvan” was introduced in 1952, the USAF was giving consideration to a new generation of turboprop-powered tactical transports.



**Converted from a C-119G, this AC-119K gunship is seen with addition of auxiliary jet engines. The extra boost allowed a higher takeoff weight and operations over the mountainous terrain of Laos and North Vietnam.**

tail” conversion, a horizontally split door system in which the bottom door formed a loading ramp; as part of the 1968 Gunship III program, 26 C-119Gs became the AC-119G side-firing gunship, armed with four 7.62-mm rotary miniguns and two 20-mm rotary cannons; in the second phase of Gunship III, a further 26 C-119Gs became the AC-119K when, in addition to the miniguns and cannons, they received specialized avionics for night operations and a pod-mounted J-85 auxiliary jet engine under each wing to facilitate operations at higher combat ceilings; and later in their careers, 24 C-119Gs became the C-119L when retrofitted with three-bladed Aeroproducts propellers. A number of the beaver tail C-119Js obtained prefixes after being equipped for specialized duties: four converted to satellite tracking as the EC-119J; three converted to medical evacuation as the MC-119J; and three converted to staff transports as the VC-119J.

In 1949 and 1950, C-119Bs and Cs began replacing C-47s and C-82s in operational troop carrier units just as fast as Fairchild could deliver them. In September 1950, following two months of operational testing with the Far East Air Force (FEAF), C-119s deployed for combat duty in Korea with the 314th Troop Carrier Wing, and in December, played a vital role in air-drops to re-supply Marine and Army troops during the retreat from the Chosin Reservoir. In paratroop operations, a C-119 typically carried 46 paratroops, plus 15 monorail and four door parachute supply bundles to be dropped with them. As well as FEAF in the Pacific, C-119s became the principal aircraft type in troop carrier wings throughout U.S. Air Forces in Europe



(USAFE), where they deployed from bases in Britain, France and Germany to support various operations not only in Europe but in far flung locations like Greenland, Central Asia, and Africa. During 1960, EC-119Js of the 6593rd Test Squadron out of Hickam AFB, Hawaii, carried out the first aerial recoveries of intelligence-gathering satellite instrument packages. The phase-out of C-119s from frontline USAF troop carrier units began taking place in mid-1950s as newer aircraft, most notably C-123s and C-130s, arrived to take their place, with the last examples being withdrawn in 1962. After release from active USAF duties, many C-119s continued in service with both USAF reserve and ANG units up until 1975. The converted gunships, AC-119Gs and Ks, remained active with USAF Special Operations Squadrons until late 1971. Many ex-USAF C-119s were also transferred to NATO air forces (Belgium, France, Italy, and Norway) and to other nations (Cambodia, Taiwan, Ethiopia, India, Jordan, Morocco, Spain, and South Vietnam) under various Military Assistance Programs (MAP).

*Naval Variants:* BuAer procured C-119s in two batches for the Marine Corps: 39 C-119Bs ordered in 1949 under the designation R4Q-1 and 58 C-119Fs in 1952 as the R4Q-2. R4Q-1s began entering operational service with VMR-252 out of MCAS Cherry Point, North Carolina, during 1950 and soon afterward, deployed overseas to support Marine operations in Korea. Although Marine R4Q-1s received upgrades that brought them up to the USAF C-119C standard, they were withdrawn from frontline service in VMR-252 as newer R4Q-2s arrived in 1952 and 1953 to replace them. By 1962, when the tri-service designation system took effect, all R4Q-1s had been withdrawn; remaining R4Q-2s were re-designated C-119F. In addition to standard USAF upgrades, Marine C-119Fs received additional armor plating under the engine nacelles to protect against small arms fire and a nose-mounted radar to permit all-weather operations. The last Marine C-119Fs were retired during the early 1970s.

## Fairchild C-120—1950

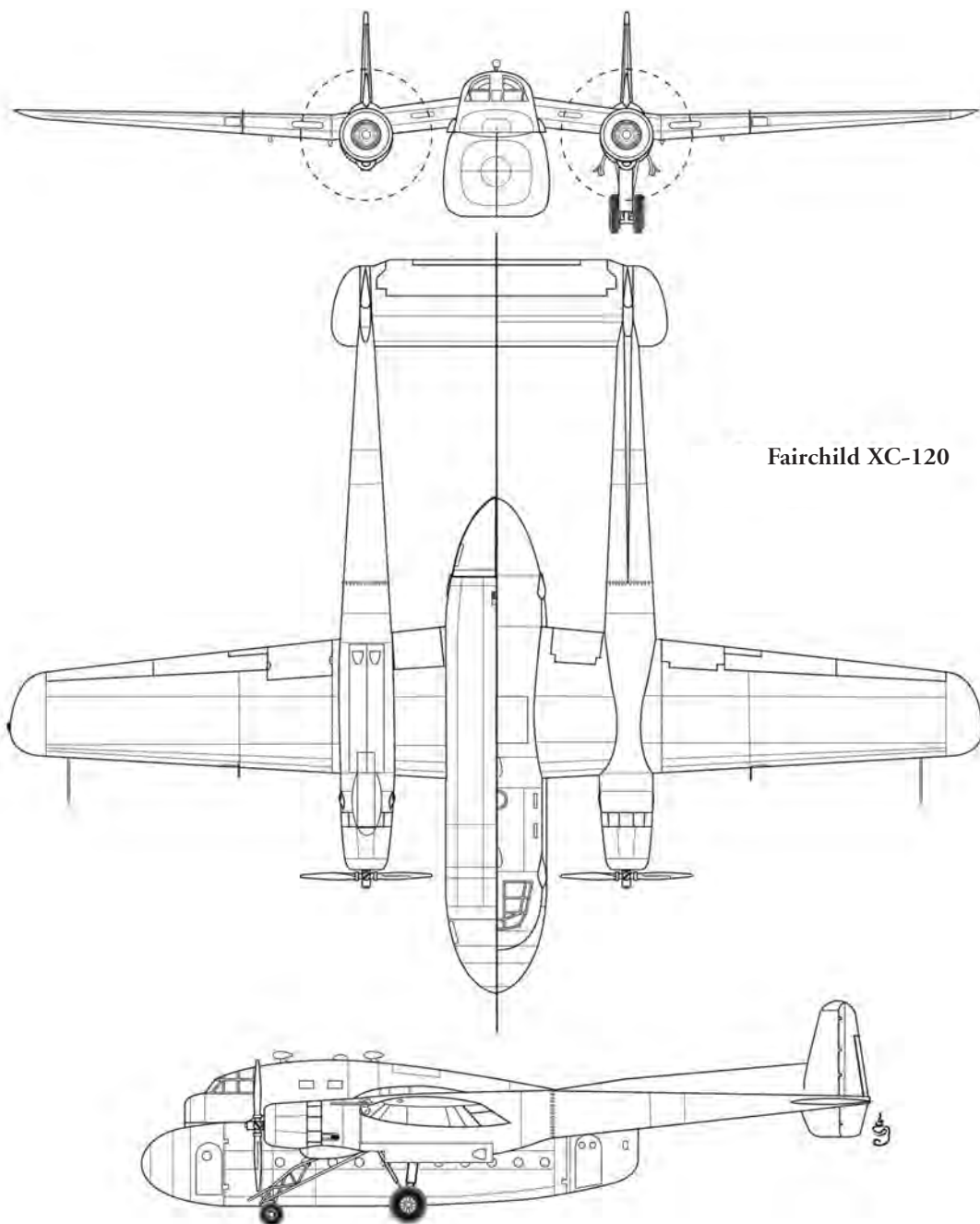
Technical Specifications (XC-120)

Type: Convertible tactical transport.

Manufacturer: Fairchild Engine & Aircraft Corp., Hagerstown, Maryland.



The XC-120 "Pack Plane" was contemplated as a tactical transport that could be rapidly reconfigured to fly paratroop, cargo, or medical evacuation missions. Only one prototype was built.

**Fairchild XC-120**

Total military versions: 1 (USAF).

Capacity: Not reported but assumed to be comparable to C-119B reported above.

Powerplants: Two 3,500-hp Pratt & Whitney R-4360-20 *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Hamilton Standard constant-speed propellers.

Performance: Max. speed 250-mph, cruise 175-mph; ceiling 23,900 ft.; range 2,290 mi.

Weights: (Not reported).

Dimensions: Span 109 ft. 3 in., length 82 ft. 10 in., wing area 1,447 sq. ft.

Historical records do not clearly indicate whether the XC-120 “Packplane” was purely a Fairchild private venture or a project initiated by a USAF requirement. In any event, Fairchild evolved the design on the premise that an aircraft having a detachable fuselage pod would offer unprecedented versatility to military transport operations. Pods would enable the aircraft to be rapidly converted to different configurations such as paratroop, bulky cargo, medical evacuation, maintenance, or other specialized applications. Starting with a C-119B airframe, Fairchild raised the flight deck and removed the all of fuselage below the wing level, improvising a unique landing gear system in which outrigger nosewheels extended in front of each main gear strut. The detachable pod, mounted on retractable wheels, could be rolled into position and connected to the upper airframe in minutes. After making its first flight from the factory on August 11, 1950, the prototype was flown to Wright-Patterson AFB and officially evaluated under the USAF designation XC-120. Air Materiel Command is thought to have considered placing the type into production as the C-128, but no contract was ever forthcoming, and the XC-120 was ultimately scrapped during the early 1950s.

## Chase C-122 — 1948

Technical Specifications (YC-122C)

Type: Light tactical transport.

Manufacturer: Chase Aircraft Co., Trenton, New Jersey.

Total military versions: 11 (USAF).

Capacity: Crew of two plus 30 troops, 24 medical litters, or 7,500 lbs. of cargo.

Powerplants: Two 1,425-hp Wright R-1820-101 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed propellers.

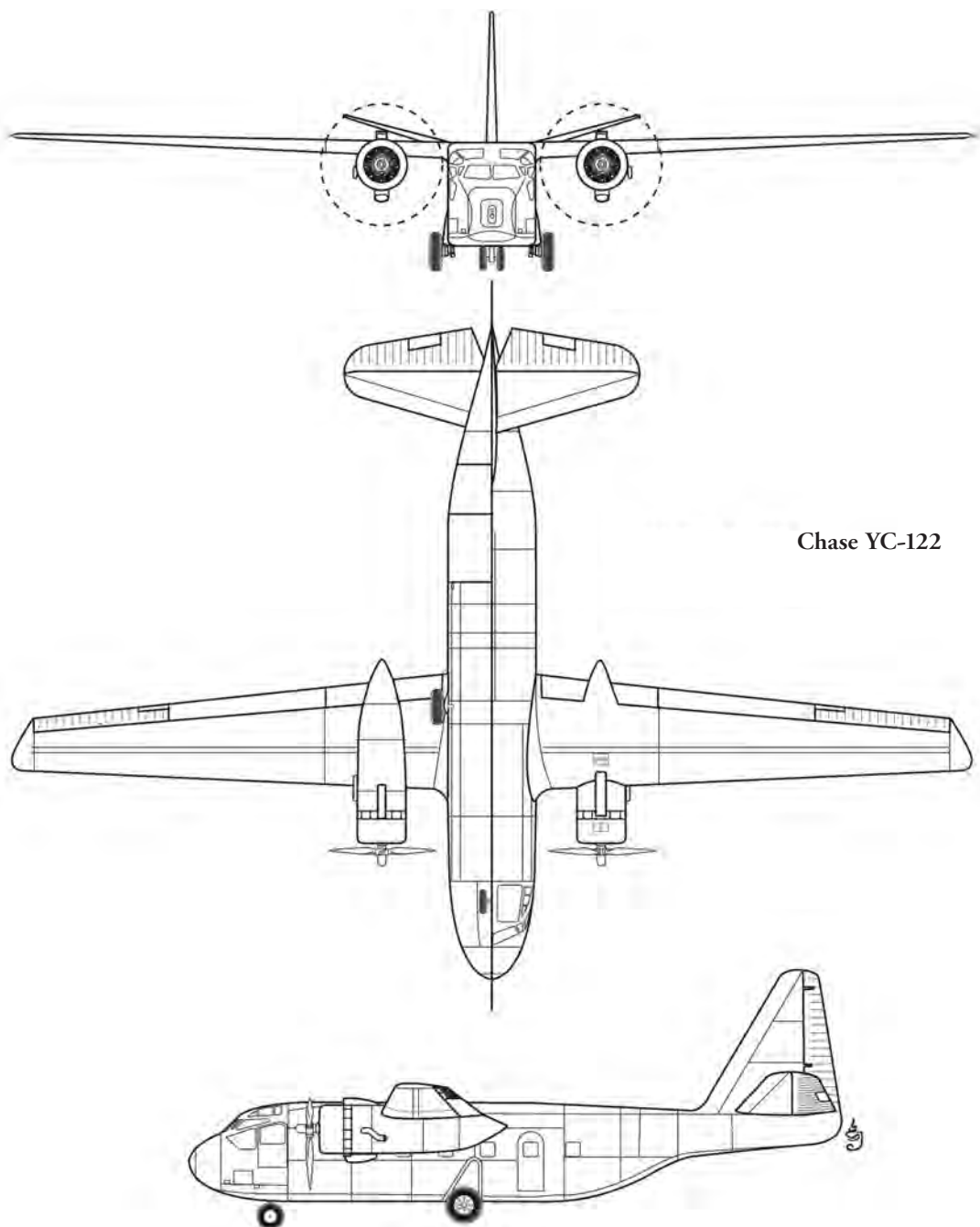
Performance: Max. speed 220-mph; ceiling (not reported); range 2,900 mi.

Weights: 19,000 lbs. empty, 32,750 lbs. loaded, 34,200 lbs. max. takeoff.

Dimensions: Span 95 ft. 8 in., length 61 ft. 8 in., wing area 1,050 sq. ft. (est.).



One of nine *Cyclone*-powered service test YC-122Cs delivered in 1950. These aircraft formed the antecedent for powered intra-theater tactical transports to take the place of troop gliders in combat operations.



Chase YC-122

The Chase YC-122 “Avitruc,” after originating as a glider design, became the forerunner of the Fairchild C-123 “Provider.” Chase Aircraft Co. had been formed by Michael Stroukoff in 1943 for the purpose of developing assault gliders for AAF airborne operations. After testing wooden glider prototypes in 1945 and 1946 — the 16-place XCG-14 and 24-place XCG-14A — the company introduced the all-metal, 32-place XCG-18A in late 1947. Although Chase received a follow-up contract for five service-test YCG-18As in early 1948, USAF officials were also inter-

ested in the feasibility of a small assault transport capable of operating in the battle zone under its own power. With this in mind, Air Material Command directed Chase to complete the fifth YCG-18A with wing-mounted 1,100-hp Pratt & Whitney R-2000 engines. The powered prototype made its first flight on November 18, 1948, and following delivery to the USAF for military testing, received the designation YC-122. Except for engines and fuel cells, the YC-122 retained the main characteristics of its glider origins: fixed, tricycle landing gear, box-like fuselage with the flight deck forward, and a sharply upswept rear fuselage incorporating a hydraulically operated loading ramp.

A second prototype, with 1,300-hp R-2000-3 engines, was delivered in early 1949 as the YC-122A, then following conversion to 1,450-hp Wright R-1820-101 engines, re-designated YC-122B. At the same time, however, Air Material Command had determined that a powered derivative of Chase's larger, retractable gear XCG-20 (the proposed XC-123) held more development potential as a production aircraft. Still, in order to accumulate more field-testing experience with small transports in the short term, Air Material ordered nine more Wright-powered service-test aircraft as the YC-122C. Following delivery to the USAF in 1950, the YC-122Cs participated in operational field exercises from 1951 to 1955 with troop carrier units at Stewart AFB, Tennessee and Ardmore AFB, Oklahoma. All were withdrawn in 1957, with the fuselage of one YC-122C later being adapted to the Hiller tilt-wing X-18A.

## Fairchild (Chase/Stroukoff) C-123 and C-134—1949

Technical Specifications (C-123K)

Type: Tactical transport.

Manufacturer: Chase Aircraft Co. (acquired by Kaiser Motor Corp. in 1953), Trenton, New Jersey, and Ypsilanti, Michigan; Fairchild Engine & Aircraft Corp., Hagerstown, Maryland; and Stroukoff Aircraft Corp., Trenton, New Jersey.

Total military versions: 302 (294 USAF; 8 USCG).

Capacity: Crew of 4 plus 60 troops, 50 medical litters, or 24,000 lbs. of cargo.

Powerplants: Two 2,300-hp Pratt & Whitney R-2800-99W *Double Wasp* 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed propellers and two General Electric J-85-17 turbojet engines, each rated at 2,850 lbs./s.t.

Performance: Max. speed 245-mph, cruise 205-mph; ceiling 29,000 ft.; range 1,470 mi.

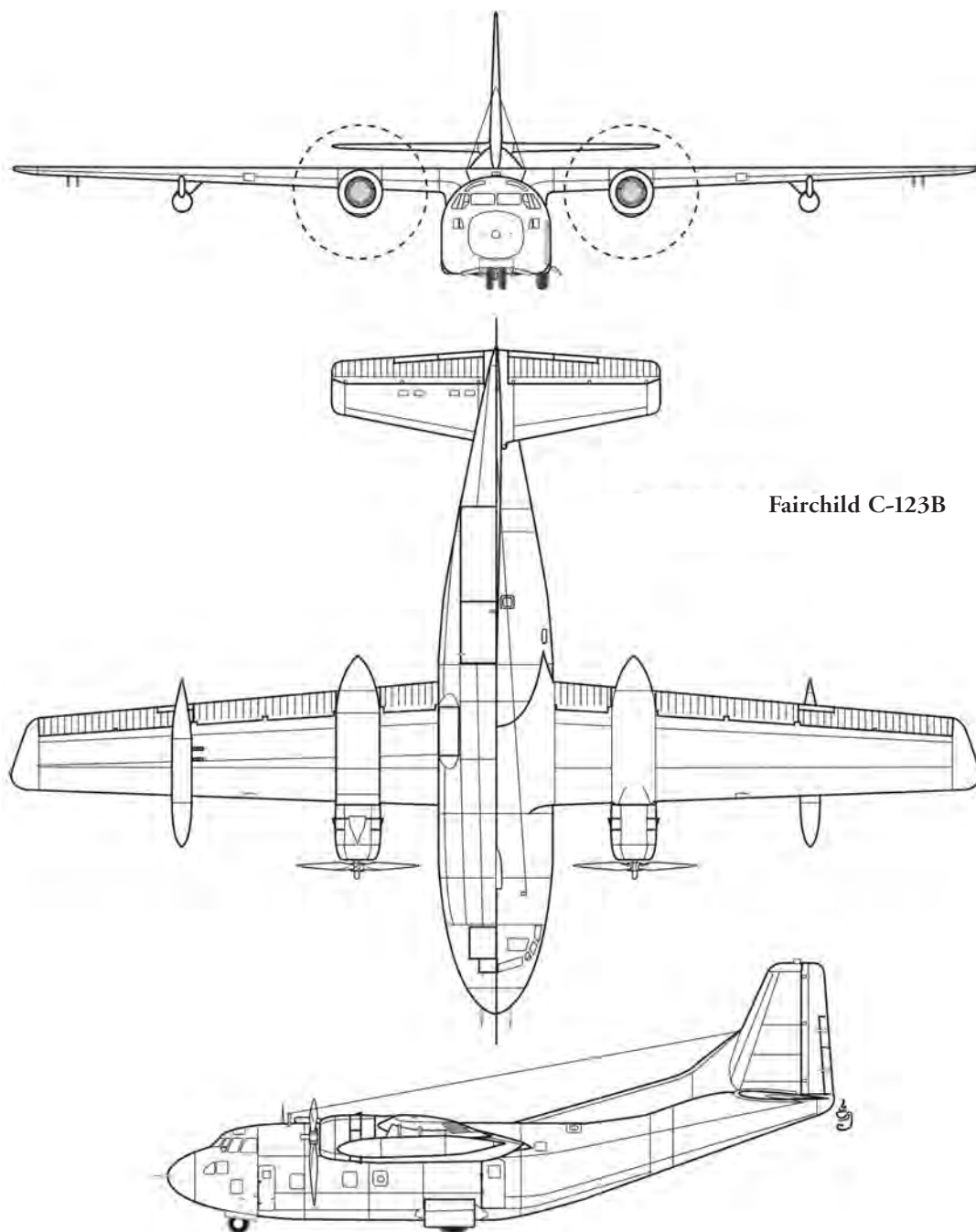
Weights: 35,366 lbs. empty, 60,000 lbs. max. takeoff.

Dimensions: Span 110 ft., length 75 ft. 3 in., wing area 1,223 sq. ft. (est.).

Perhaps more than any other aircraft design, the C-123 "Provider" established the pattern for modern tactical transports, and akin to the C-122 (reported above), its airframe configuration stemmed from an un-powered assault glider, the 64-place Chase XCG-20. By the late 1940s, the independent USAF was moving away from the World War II concept of towed assault gliders in favor of new types of powered transports having short and rough field capability. In early 1949, after testing powered adaptations of Chase's XCG-18A — the YC-122 and YC-122A — Air Material Command instructed the company to modify the first XCG-20 airframe for installation of two 2,100-hp R-2800-83 engines under the new designation XC-123. Compared to the YC-122, the XC-123 was 15 percent larger overall, aerodynamically cleaner, with retractable landing gear, and most important, expected to carry over twice the payload under similar operational conditions. After completing its first flight on October 14, 1949, the XC-123 underwent six months of military trials, and then was sent to Eglin AFB, Florida to undergo extensive field-testing.

The second XCG-20 airframe, briefly tested as a glider during the spring of 1950, was returned to Chase to be fitted with four General Electric J-47-11 turbojet engines (5,400 lbs./s.t.





Fairchild C-123B

each), mounted in paired nacelles under each wing and reemerged as the XC-123A. Unlike the purely tactical assault mission of the XC-123, the XC-123A was envisaged in the role of a high-speed transport carrying high-priority cargos and personnel between bases and combat zones. When it flew on April 21, 1951, the XC-123A earned the distinction of being the first pure jet transport of American design. Although the jet variant exhibited acceptable flight characteristics and speeds (500-mph max., 400-mph cruise), the USAF decided against further development



**Main production variant, the C-123B. Fairchild delivered 300 examples between 1954 and 1958 following USAF cancellation of its contract with Chase Aircraft Co. Sixty were assigned to SAC for logistics support of northern bases.**

when testing revealed marginal short-field capability coupled with the inability to operate from unimproved fields due to ingestion of debris in the low slung nacelles. Meanwhile, the piston-engine XC-123 had shown itself to be very well suited for the assault mission, able to operate in and out of short and/or unimproved fields carrying 60 fully equipped troops or evacuating 50 casualties in medical litters.

In late 1952, the USAF gave Chase a contract to build 300 production aircraft as the C-123B. The B differed from the prototype in having 2,300-hp R-2800-99W engines with water-methanol injection, a squared fin with a large dorsal fillet, and auxiliary fuel tanks under each wing. In May 1953, just as production got underway, Kaiser Motor Corp. acquired controlling interest of Chase and announced plans to move its operations to Kaiser's plant in Ypsilanti, Michigan; however, only two aircraft had been completed (both eventually scrapped) when the USAF terminated the contract due to other difficulties with Kaiser. Air Material Command then solicited competitive bids to manufacturers for the C-123B contract, eventually awarding production rights for delivery of 300 aircraft to Fairchild in October 1953. The first Fairchild-built C-123B was flown sometime in late 1954 and initial deliveries to the USAF began in the spring of 1955, all 300 having been accepted by the end of 1958.

During the course of their service careers, virtually all C-123s were subjected to modifications or upgrades at some point. In 1954, while Fairchild was still tooling-up to produce C-123Bs, the jet-powered XC-123A went to Stroukoff Aircraft Corp. (a spin-off formed by Michael Stroukoff after Kaiser's acquisition of Chase) to be modified for experimental developments under the designation YC-123D. To optimize short takeoff and landing (STOL) performance, Stroukoff replaced the jet engines with 2,250-hp R-2800-CB15 radials and installed a boundary



**The Chase XC-123A, seen taking off, was the first pure-jet transport of American design. Marginal short-field capabilities and engine ingestion of debris caused Air Material Command to decide against further development.**

layer control (BLC) system that forced air over the flaps. In tests that followed, the YC-123D demonstrated the ability to land and takeoff in less than half the distance needed by a C-123B. Shortly afterward, this aircraft became the YC-123E when Stroukoff added a unique “Pantobase” ski-type landing gear system that could operate off any type of surface, including ice or water. Stroukoff’s most far-reaching project began in 1956 when the changes made to a stock C-123B were so extensive that it re-emerged as the YC-134. Modifications included installation of two 3,500-hp R-3350-89A engines with four-bladed propellers, vertical finlets on the horizontal stabilizers, three-wheeled main landing gear, new fuel system, and the BLC system tested on the YC-123D, with provision to add the Pantobase landing gear system. After making its first flight in December 1956, the YC-134 underwent testing over the next two years. While outperforming the C-123B in every category, the USAF decided against production of the YC-134 due to procurement plans for other aircraft such as the newer Lockheed C-130A.

From the mid-1950s onward, many other C-123s underwent modifications and improvements at Fairchild’s plant. In 1955, at the behest of the USAF, a C-123B was tested after a pod-counted Fairchild J-44 turbojet engine had been added to each wingtip. The small jets (rated at 1,000 lbs./s.t. and designed for target drones), served mainly to boost performance during takeoff and climb and to improve safety margins of operating on a single piston engine. Fairchild subsequently completed this modification on nine more C-123Bs that returned to service during 1956 as the C-123J. Simultaneously, the company was in the process of transforming another C-123B into the vastly improved YC-123H, with the goal obtaining a new production contract. To augment takeoff/climb performance and increase takeoff weights, a General Electric J-85-3 turbojet engine (rated at 2,450 lbs./s.t) was mounted under each wing, and to facilitate operations off unimproved airstrips, the landing gear was replaced with a wide-track system having larger



**This C-123K of the 311th Air Commando Squadron is seen delivering a Marine unit to Ca Lu South Vietnam in 1968.**

tires. The YC-123H performed adequately in official trials, however, Air Material Command elected not to place it into production. Eight C-123Bs transferred to the Coast Guard between 1958 and 1961 were re-designated HC-123B after receiving nose-mounted APN-158 search radar systems and equipment specialized for search and rescue.

During the early 1960s, as the USAF became increasingly involved in counter-insurgency operations in Southeast Asia (i.e., South Vietnam, Laos, and Cambodia), it was faced with an urgent need for small transports capable of operating out of short, unimproved jungle airfields. Starting in mid-1962, and extending through the mid-1960s, 183 C-123Bs received the J-85 jet engine upgrade of the YC-123H and returned to service as the C-123K. The extra power not only increased takeoff weight by a third, but significantly shortened takeoff distance, improved climb rate, and increased the safety of single, piston-engine operations. In service, a number of C-123Ks received equipment or modifications for specialized duties: one fitted with a passenger interior for the use of Gen. William C. Westmoreland became the VC-123K; 34 modified for jungle defoliation became the UC-123K; and two equipped with radar, infrared, and low-light TV systems for experimental night operations (i.e., "Black Spot") became the NC-123K (sometimes called the AC-123K).

Production C-123Bs began entering operational service with troop carrier units in mid-1955, starting with the 309th TCG at Ardmore AFB, Oklahoma, then from 1958 onwards, 60



**Fairchild modified 183 C-123Bs to the C-123K standard. This example, in VNAF markings, is preserved at the U.S. Air Force Museum in Dayton, Ohio.**

were assigned to SAC for supporting bases in northern, cold-weather latitudes. Following conversion, the ten jet-augmented C-123Js, rigged with skis, provided logistical support to USAF Arctic operations until 1960, when they were removed from active service and transferred to the Alaska ANG.

The active service life of the C-123 might have been brief but for the escalation of U.S. military operations in Southeast Asia. In 1962, under the aegis of the CIA-controlled “Air America,” C-123Bs were used to supply special operations in Laos and Vietnam and by 1964, four USAF squadrons of C-123Bs were regularly flying airlift and airdrop missions for Military Assistance Command Vietnam (MACV). Around the same time, the USAF commenced a widespread jungle defoliation campaign known as “Ranch Hand” and “Trial Dust” using a chemical herbicide called Agent Orange, starting operations with C-123Bs fitted with spray apparatus as the UC-123B and continuing with similarly equipped UC-123Ks. Following U.S. withdrawal from Southeast Asia, the lingering effects of Agent Orange produced to a storm of public controversy that persists to this day.

As they became available, recently modified C-123Ks displaced C-123Bs throughout the Southeast Asian combat theater. And in South Vietnam, they were often the only type of fixed-wing cargo transport capable of operating in and out of the primitive jungle airstrips that supported many of the American firebases. A prime example took place in 1968 when C-123Ks of the 315th Special Operations Wing flew 179 sorties to re-supply the beleaguered Marine bastion at Khe Sanh. As American military involvement in Southeast Asia drew to a close during the early 1970s, C/UC-123Ks were taken off the active inventory and transferred to the USAF reserve, where they continued to serve until withdrawn during the early 1980s. All Coast Guard HC-123Bs had been withdrawn and placed in storage by 1971. The type’s final military mission — providing humanitarian insect control in South and Central America — was completed by UC-123Ks of



the 302nd Tactical Airlift Wing's "spray detail." Afterward, many ex-USAF C-123s transferred to foreign nations under military assistance programs (MAP) served with air forces in Taiwan (Republic of China), El Salvador, Philippines, Saudi Arabia, South Korea, Thailand, and Venezuela.

## Douglas C-124 Globemaster II—1949

### Technical Specifications (C-124C)

Type: Long-range strategic airlift transport.

Manufacturer: Douglas Aircraft Co., Long Beach, California.

Total military versions: 448 (USAF, ANG).

Capacity: Crew of six plus 200 troops, 127 medical litters, or 68,500 lbs. of cargo.

Powerplants: Four 3,800-hp Pratt & Whitney R-4360-63A *Wasp Major* 28-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed propellers.

Performance: Max. speed 304-mph, cruise 230-mph; ceiling 21,800 ft.; range 2,175 mi.

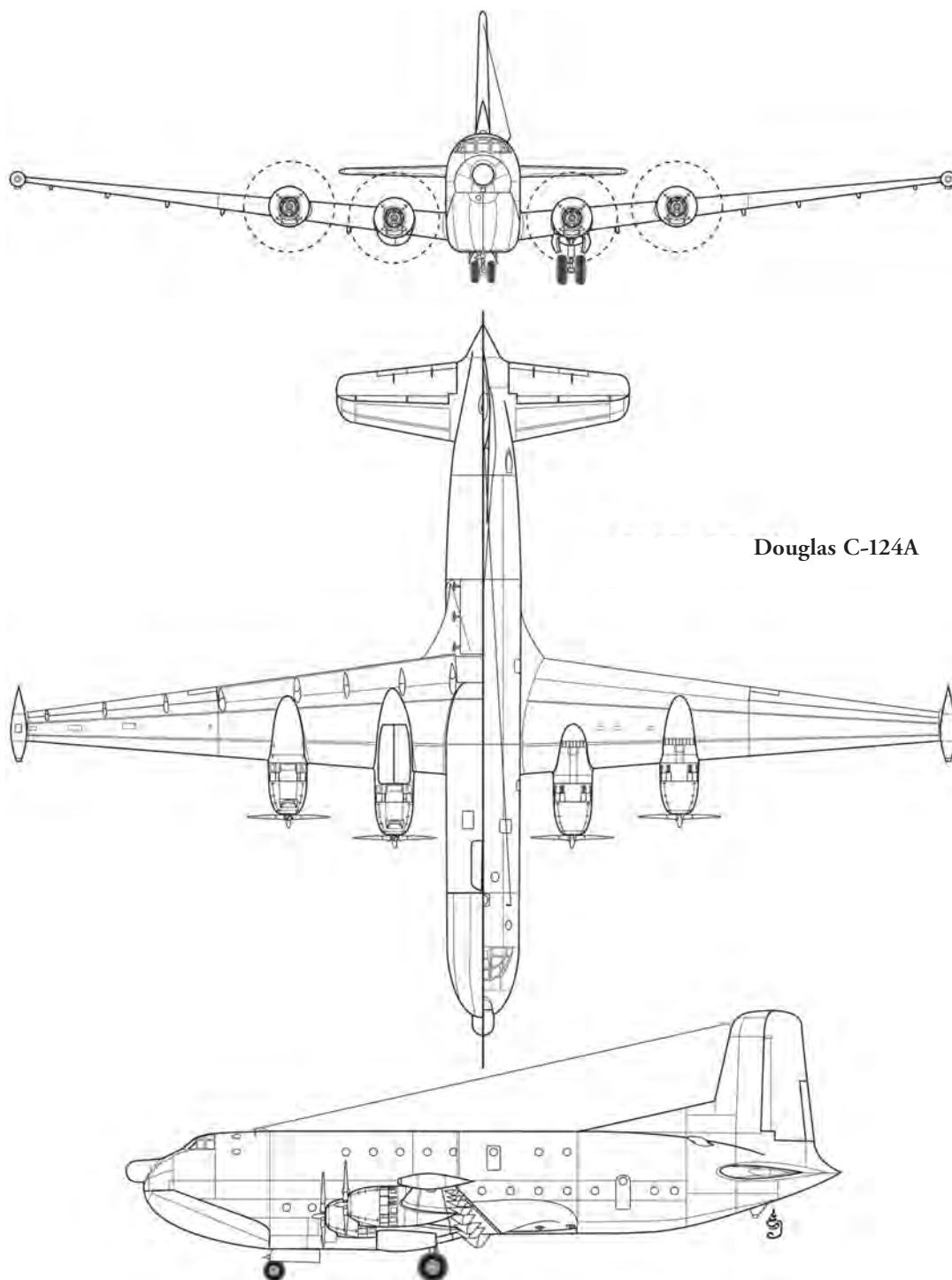
Weights: 101,160 lbs. empty, 194,500 lbs. gross, 216,000 lbs. max. takeoff.

Dimensions: Span 174 ft. 2 in., length 130 ft. 5 in., wing area 2,506 sq. ft.

Despite having been the world's largest landplane transport when it flew in 1945, the Douglas C-74 Globemaster was actually too small—in volume—to accommodate the outsized loads dictated by the American military's postwar logistical needs. In response to this problem, the fifth C-74 was held back at the factory to undergo far-reaching modifications under the new designation YC-124. Using the wings, engine nacelles, and tail group of the C-74, Douglas evolved an entirely new fuselage by adding five feet ten inches to overall length, raising the height of the main cargo bay five feet, and lowering the depth of forward fuselage to permit loading of trucks, artillery pieces, aircraft sub-assemblies, or bulky equipment through a set of full-width clamshell doors in a new nose section that incorporated a built-in, hydraulically lowered ramp. The aft, belly loading hatch of the C-74 was retained, and to assist fore and aft movement of large loads, two overhead hoists, with 16,000 lbs. lifting capacity each, were installed in the main cargo bay. When rigged in a double deck configuration, the new fuselage design could also house 200 fully equipped troops or 127 evacuees in medical litters.

Dubbed "Globemaster II," the YC-124 completed its maiden flight on November 27, 1949, and deliveries of the first of 204 C-124A production models to the USAF commenced in May 1950. The prototype became the YC-124A when re-powered with 3,800-hp R-4360-35A engines, then reemerged in 1954 as the YC-124B after being modified to serve as a flying testbed for 5,500-shp Pratt & Whitney YT34 turboprop engines. A KC-124B tanker variant was considered as a potential KC-97 replacement but never materialized. The Long Beach plant shifted to production of 243 improved C-124Cs delivered between 1952 and 1955, which differed in having 3,800-hp R-4360-63A engines, an APS-42 weather radar in a nose-mounted thimble radome, and wingtip-mounted combustion heaters that provided thermal de-icing and cabin heating, and over a period of years, the existing C-124A fleet received retrofits that brought them up to the C standard. A pressurized variant was studied as the C-124X but never built, and during the mid-1950s, a much redesigned turboprop-powered, swept-wing derivative, designated XC-132, got as far as the mockup stage but was ultimately canceled in favor of the C-133.

C-124As began entering service during 1950 in time to play an important role in the Korean War (1950–1953). For the first time, MATS possessed a long-range aircraft capable of loading bulky items like tanks, guns, trucks, and construction equipment without major disassembly; and in Strategic Support Squadrons, new Globemasters gave SAC the ability to deliver large





Early C-124A in MATS service, before addition of radome, seen in early 1950s. Note taxi observer atop fuselage behind cockpit. Advent of C-124s gave USAF ability to fly outsized cargos to international destinations.



C-124C in MAC service during the late 1960s. Pods on wingtips are combustion heaters for thermal deicing and cabin heating. Last examples left reserve and ANG service in 1974.

aircraft components to any of its widespread bases. As the USAF's C-124A and C fleet grew to planned strength in the mid-1950s, it formed the bulk-carrying nucleus of every major U.S. military airlift operation conducted from that time up until the late 1960s. Some of the C-124's more notable achievements included moving an entire squadron of Lockheed F-104s from the U.S. to Taiwan during the Formosa Straits Crisis in 1958; during Operation Deep Freeze (1957–1962), regular airdrops from C-124s formed the supply line from McMurdo Base to outlying stations in the Antarctic; and as part of Operation Big Lift in 1963, MATS C-124s moved the 2nd Armored Division and a TAC Strike Force from U.S. bases to Germany in two and a half days.

At their peak in 1963, 377 C-124s were operating with 20 different transport squadrons. As American involvement in Southeast Asia escalated in the mid-1960s, C-124s began flying transport sorties directly into South Vietnam, and from early 1966, continued with Military Airlift Command (MAC) when that organization replaced MATS. Although the USAF started the process of phasing-out C-124s from frontline service and transferring them to reserve and ANG units in mid-1960s, the type's bulk cargo capacity was not matched until Lockheed C-5s became operational with MAC during 1969–1970. From 1964 to 1972, to augment MATS/MAC operations, USAF reserve units flew C-124s on overseas sorties from eleven different bases within the continental U.S., and starting in 1966, they also served in eight ANG squadrons until the last examples were retired in mid-1974, finally ending the type's military service. The last recorded flight of a C-124 occurred on October 9, 1986 when C-124C AF Ser. No. 52-0994 was ferried from Selfridge ANG Base, Michigan to McChord AFB, Washington.

## Northrop C-125 Raider — 1949

### Technical Specifications (YC-125B)

Type: STOL tactical and rescue transport.

Manufacturer: Northrop Aircraft, Inc., Hawthorne, California.

Total military versions: 23 (USAF).

Capacity: Crew of four plus 36 troops or 10,000 lbs. of cargo.

Powerplants: Three 1,200-hp Wright R-1920-99 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed propellers.

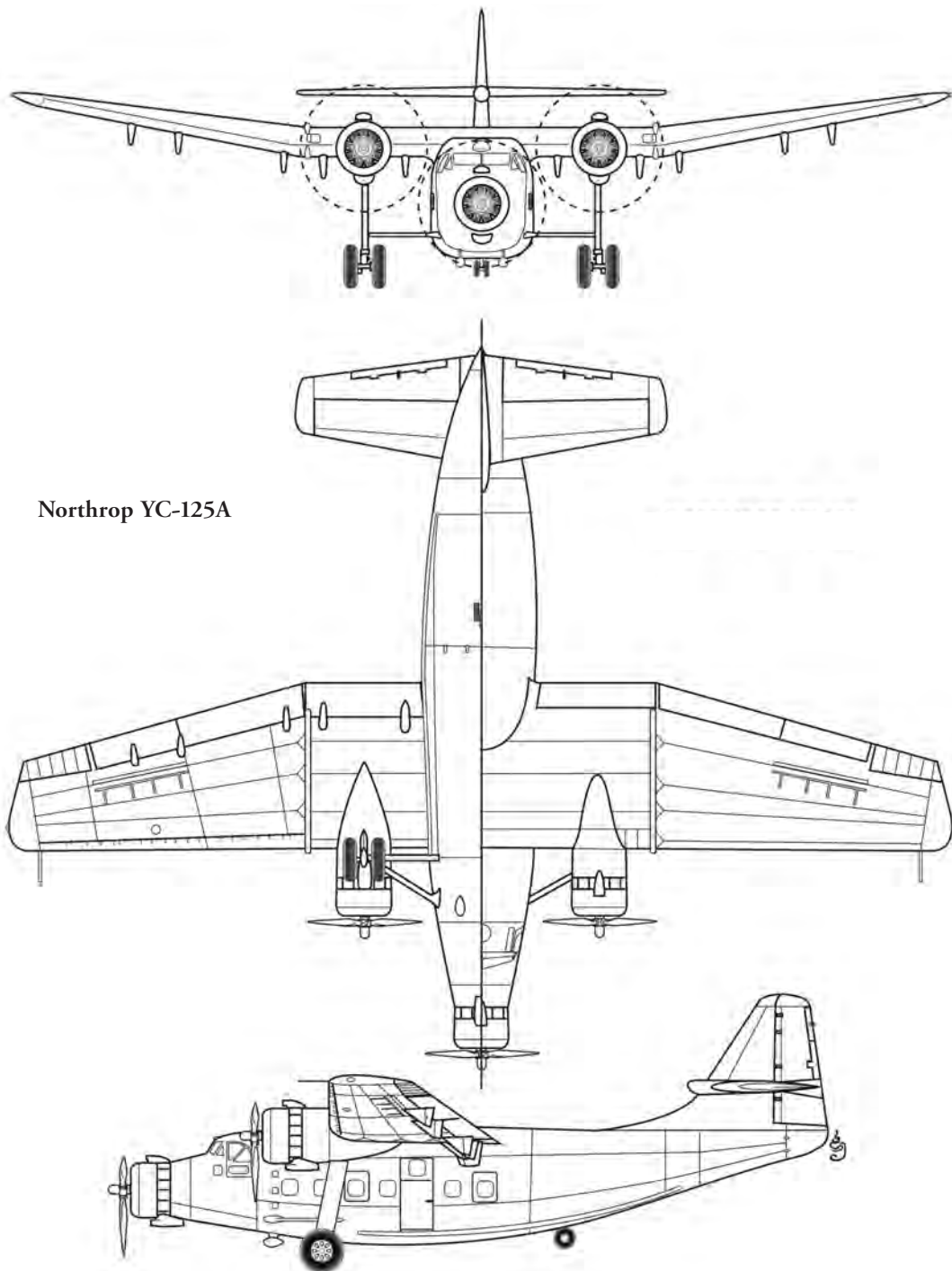
Performance: Max. speed 207-mph, cruise 171-mph; ceiling 12,200 ft.; range 1,856 mi.

Weights: Empty (not reported), 41,900 lbs. max. takeoff.

Dimensions: Span 86 ft. 6 in., length 67 ft. 1 in., wing area (not reported).

Flown for the first time in December 1946, Northrop introduced its N-23 "Pioneer" to the commercial market as a medium-sized passenger and cargo transport having the capability to operate from the short, unimproved airfields of wilderness areas. Resembling a modernized Ford Tri-motor, the N-23 appeared with a three-engine, high-wing layout resting on a fixed, conventional type of landing gear that was heavily braced for rough-field operations. The design of the cantilevered wing was characterized by a high-lift airfoil section that utilized large flaps extending to eighty percent of the span with spoilers for low-speed roll control. The N-23 prototype, powered originally by 600-hp Pratt & Whitney R-1340 engines, demonstrated the ability to takeoff within 700 feet at a gross weight of 25,500 lbs.

In 1948, when no commercial orders for the aircraft had materialized, the USAF awarded Northrop a contract to built thirteen militarized troop carrier versions of the N-23 as the YC-125A "Raider." Changes to the basic design included doubling available horsepower with 1,200-hp Wright *Cyclone* engines, a reinforced cargo floor, a rear loading ramp, and a redesigned cruciform-type empennage. While construction of the YC-125As was still underway, the USAF



Northrop YC-125A





**One of ten YC-125Bs shown taking off with jet assist in 1950. These aircraft were specially outfitted for the Arctic rescue role but served only briefly before being withdrawn.**

gave Northrop an order to deliver ten more aircraft specially outfitted for the Arctic rescue role as the YC-125B. The flight of the first YC-125A took place on August 1, 1949, and deliveries of the remaining YC-125A and B service test examples began in early 1950. After being subjected to extensive operational trials, the YC-125s revealed themselves to be too underpowered to perform either of their intended missions — short-field assault transport or Arctic rescue. Evaluating officials apparently reached the conclusion that other aircraft being tested (e.g., the Chase

XC-123 and new types of rescue helicopters) possessed better development potential. Lacking an operational role, the YC-125s went to Sheppard AFB, Texas to serve as ground instruction trainers until 1955, when they were declared surplus.

## Cessna UC/LC-126/U-20—1949

### Technical Specifications (LC-126A)

Type: Light utility transport and instrument trainer.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 83 (15 USAF; 68 Army, Army NG).

Capacity: One pilot plus four passengers or 2,020 lbs. of cargo.

Powerplant: One 300-hp Jacobs R-755-A2 7-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard constant-speed propeller.

Performance: Max. speed 175-mph, cruise 140-mph; ceiling 20,000 ft.; range 856 mi.

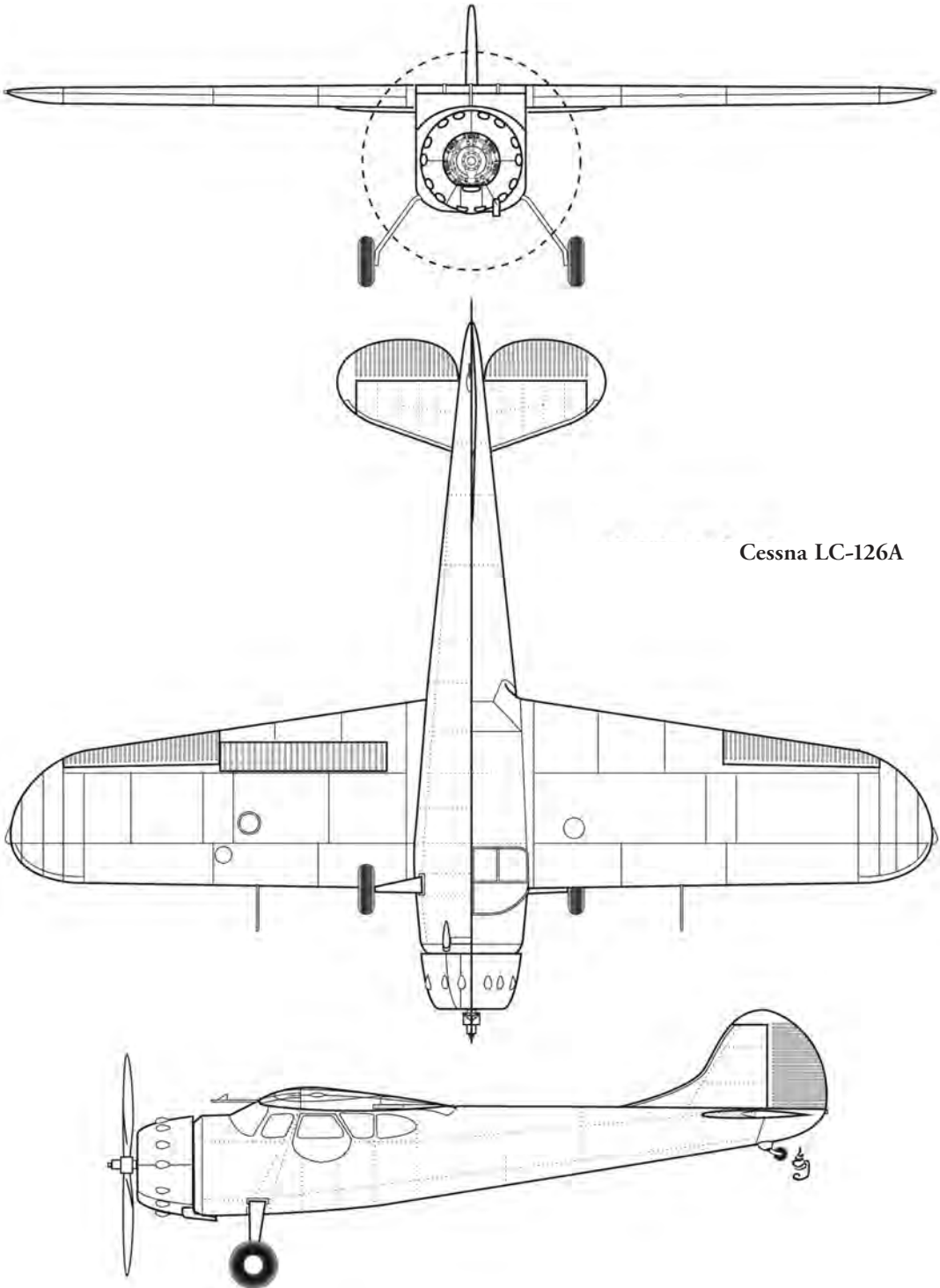
Weights: 2,050 lbs. empty, 3,350 lbs. loaded.

Dimensions: Span 36 ft. 2 in., length 27 ft. 4 in., wing area 218 sq. ft.

Coming as Cessna's first all-metal airplane, the prototype for the model 190/195 series made its first flight in late 1944 and entered production in 1947 following type certification. Offered



This U.S. Army LC-126C was built in 1952 and served primarily as an instrument trainer. USAF LC-126As were outfitted for Arctic rescue. All examples still in service in 1962 became U-20s.



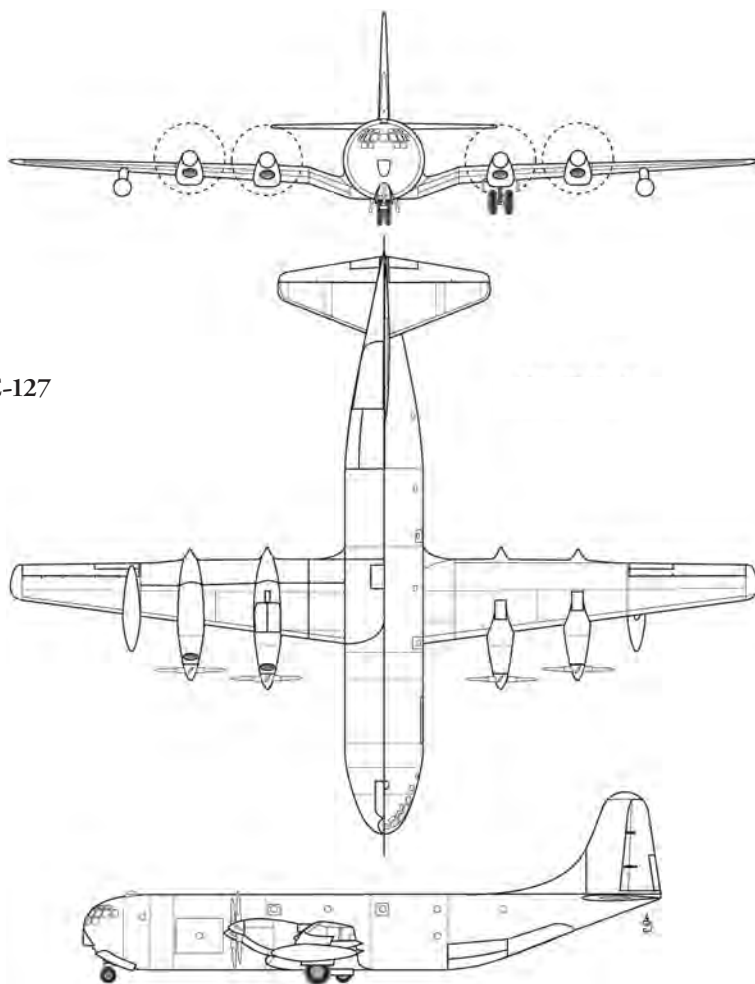
Cessna LC-126A

primarily as a business and charter aircraft, its general design followed the aerodynamic form of the earlier Airmasters (see UC-77 and -94 above) but introduced an NACA 2412 airfoil section and the spring-landing gear patented by Steve Wittman. In 1949, the USAF procured 15 almost stock model 195s, initially as the UC-126A but later changed to LC-126A, with plans to use them for Arctic rescue duties, and the order included an interchangeable set of floats and skis for each aircraft. As the LC-125As were delivered, all were placed in service with the 10th Rescue Squadron at Elmendorf AFB, Alaska.

In 1951 the Army purchased five model 195s from Cessna, which were placed into service as light transports for Army National Guard units under the designation LC-126B. Under another Army contract issued in 1952, Cessna delivered 63 more model 195s to be used as instrument trainers as the LC-126C. Historical data suggests that all of the USAF LC-126As had been withdrawn and declared surplus by the late 1950s. Following adoption of the Tri-Service system in 1962, LC-126Bs and Cs remaining in Army service were re-designated U-20B and C, respectively.

### Boeing C-127 (turboprop proposal, canceled)

Boeing XC-127



## Lockheed C-130 (R8V/UV/GV) Hercules—1954

### Technical Specifications (C-130H [C-130J-30])

Type: Tactical and strategic airlift transport.

Manufacturer: Lockheed Aircraft Co. (Lockheed-Martin since 1994), Marietta, Georgia.

Total military versions: 1,239 (1,115 USAF, USAFR, and ANG; 124 USN, USMC, and USCG), not including approximately 1,200 sold to foreign air forces.

Capacity [C-130J-30]: Crew of five [three], 92 [128] troops, 74 [92] medical litters, or 45,000 lbs. [44,000 lbs.] of cargo.

Powerplants: Four 4,590-shp Allison T-56-A-15 [4,700-shp Rolls-Royce AE2100D3] turboprop engines driving four-bladed Hamilton Standard electro-hydromatic, constant-speed, reversible-pitch metal [six-bladed Dowty R391 composite] propellers.

Performance: Max. speed 366-mph [417-mph], cruise 336-mph [400-mph]; ceiling 33,000 ft. [30,560 ft.]; range 2,360 mi [2,835 mi.].

Weights: 75,800 lbs. [75,562] empty, 155,000 lbs. [175,000 lbs.] max. takeoff.

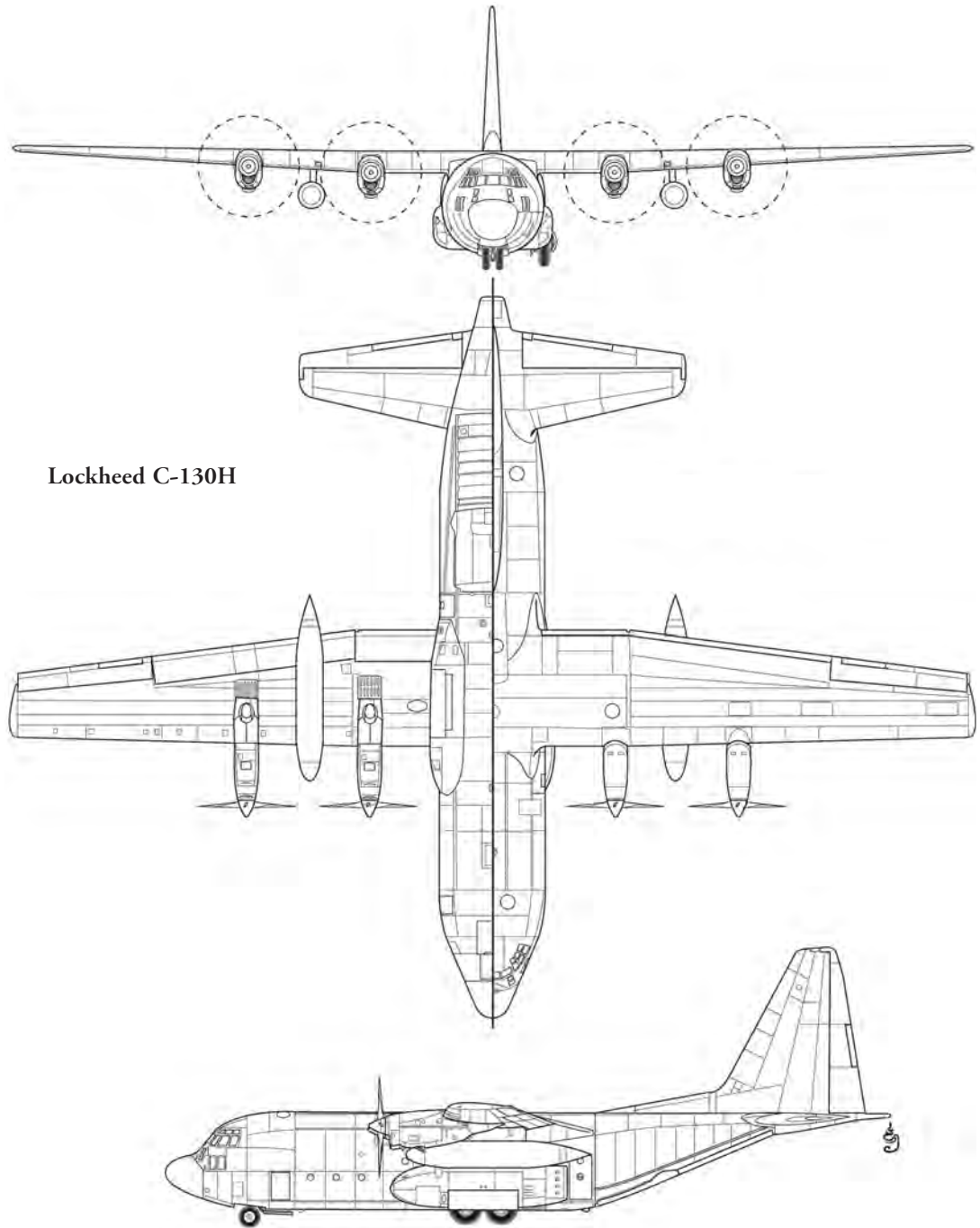
Dimensions: Span 132 ft. 7 in., length 97 ft. 9 in. [112 ft. 9 in.], wing area 1,745 sq. ft.

It is a truly remarkable fact that the Lockheed C-130 Hercules, which originated from a USAF requirement issued during the Korean War, has at this writing been in continuous production — 56 years — longer than any other type of military aircraft. Built in five major production variants and at last count, 59 specialized sub-variants, the C-130 deserves to be recognized as the most significant tactical transport of the post-World War II era. In early 1951, after recent experience in Korea had clearly shown the combat deficiencies of existing tactical transports like the C-46, C-47, and C-119, USAF Air Material Command issued a General Operating Requirement (GOR) to eight major aircraft manufacturers for a entirely new aircraft possessing a 42-foot by 10-foot cargo bay that would accommodate up to 72 fully equipped troops. The specification called for a droppable, rear-loading ramp that could also be used for airdrops and low-altitude extractions. The Lockheed engineering team led by Willis Hawkins responded in July 1951 with the proposed model 82, a four-engine, turboprop design having an aerodynamic configuration similar to that of the Chase (Fairchild) C-123. A key feature of Lockheed's proposal was the projected performance that would be derived from the T-56 engines, which Allison was developing specifically for the project. Interior volume was optimized by locating the wing center-section above the cargo bay and enclosing the double-truck main landing gear in streamlined fairings on either side of the lower fuselage. In 1952, after scrutinizing various proposals, the USAF awarded Lockheed a contract to build two service test prototypes as the YC-130.

When the first YC-130 prototype flew on August 24, 1954, it represented a quantum leap in tactical transport design. Compared to contemporaneous piston-engine types like the C-119 and C-123, Lockheed's new aircraft carried twice the payload, 100-mph faster over the same distance, while operating from short, unimproved airstrips under combat conditions. Equally important, the YC-130 could maintain altitude at gross weight after the loss of an engine in flight. In a series of contracts dating from 1953 to 1957, the USAF ordered 204 production models as the C-130A, with initial deliveries commencing December 1956. C-130As, powered by 3,750-shp T-56-A-1 or A-9 engines driving three-bladed propellers, differed from the prototype in having provision for a 450-gal. external fuel tank under each wing, and starting with the 28th example, a nose radome housing an APS-42 search radar. In service, a number of C-130As received designation prefixes after being modified for specialized duties: eighteen converted to side-firing gunships as the AC-130A "Spectre"; eight converted to target drone directors

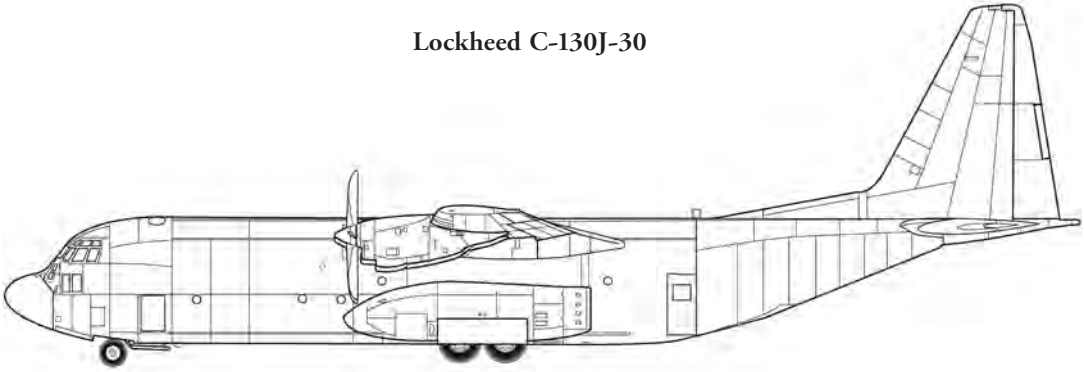
**Opposite:** As proposed, the XC-127 utilized major C-97 components with turboprop engines, increased fuselage diameter, and gulled wings to lower the loading ramp.





**Lockheed C-130H**

**Lockheed C-130J-30**



Early C-130A without nose radome, probably in 1956. The first of 204 C-130As began replacing C-119s in Troop Carrier Wings during 1956. C-130Bs began entering operational service in 1958.

as the DC-130A (initially GC-130A); sixteen converted to track missiles as the JC-130A; five used for electronics testing as the NC-130A; sixteen modified for photo-reconnaissance as the RC-130A; and one configured as a proposed crew trainer as the TC-130A. A number of these returned to service as C-130As after their specialized equipment had been removed.

In late 1958, the USAF began accepting delivery of the first of 133 C-130Bs that had been ordered to supplement the existing C-130A fleet. The B came with increased fuel capacity, 4,050-shp T-56-A-7 engines driving four-bladed propellers, and increased operating weights. As with the C-130A, some C-130Bs received prefixes following modifications for specialized missions: fourteen fitted with retractable tongs for satellite recovery as the JC-130B; one receiving a boundary-layer control (BLC) system for STOL experiments as the NC-130B; thirteen converted to electronic reconnaissance as the RC-130B; one reconfigured as a staff transport as the VC-130B; and five new-builds plus eleven conversions to weather reconnaissance as the WB-130B. The C-130C, a proposed STOL version based on the NC-130B, was never built. In 1957 and 1958, twelve C-130As were re-designated C-130Ds when they were equipped with retractable skis for service in Alaska and Greenland but later returned to service as C-130As after being reconfigured to wheels.

The third major production variant, the C-130E, arose from a USAF desire to add long-range logistical support to the type's tactical capabilities, and flew for the first time in August 1961. Changes from the B model standard included a 1,900-gal. increase in internal fuel capacity,



C-130E, painted in Southeast Asian camouflage scheme, is shown making a parachute-deployed pallet drop. Last C-130Es were reported to have retired from ANG units at the end of 2011.



**Painted in a modern low-visibility finish, this C-130H is assigned to the Wyoming Air National Guard. Currently, 102 C-130s are reported to be serving in various ANG units.**

1,360-gal. external fuel tanks moved inboard between the engine nacelles, a 30,800 lb. increase in takeoff weight, and with the ninth C-130E, deletion of the forward cargo door. Initial deliveries of C-130Es to operational units began in April 1962, with a total of 377 having been accepted when production ended in 1965. As with previous variants, E models subsequently modified for specialized duties received designation prefixes: eleven converted to side-firing gunships as the AC-130E “Spectre” (some later upgraded as AC-130H); seven modified to launch and control target drones as the DC-130E; ten equipped as airborne battlefield command and control centers (ABCCC) as the EC-130E; one temporarily used for unspecified testing as the JC-130E; four equipped for special operations as the MC-130E “Combat Talon”; two used for electronics testing as the NC-130E; six modified for weather reconnaissance as the WC-130E; and nineteen converted for search and rescue with Fulton surface-to-air recovery systems and helicopter in-flight refueling systems as the HC-130P or HC-130N (without Fulton recovery apparatus), both known as “Combat King.” All C-130F/G variants, based on the E model, either went into Navy and Marine service (reported in detail below) or were exported to foreign air forces.

Emerging in mid-1965 as the fourth major production variant, the C-130H was essentially identical to the E except for more powerful 4,508-shp T-56-A-15 engines, an improved braking system, and a strengthened wing center-section. Initial C-130H production, however, went to foreign customers, with the USAF taking delivery of 308 examples between 1974 and 1997. In addition to C-130H production models, a number of C-130Es were re-designated after being retrofitted to the H standard: ten as the AC-130H “Spectre,” which included a new electronics suite and addition of a boom refueling receptacle aft of the cockpit; two drone controllers as the DC-130H; four ABCCC types as the EC-130H; and forty-three initially outfitted for rescue and recovery as the HC-130H, though the equipment was later removed, with most returning to service as the C-130H, plus fifteen subsequently re-modified for weather reconnaissance as the WC-130H. (Note: the HC-130H designation was also applied to 18 similar aircraft transferred

to the Coast Guard). The C-130H2, introduced in 1978, featured an improved wing center-section and upgraded avionics, and the C-130H3, initially delivered in 1992, came with ring laser gyros for inertial navigation, GPS receivers, a partial glass cockpit, night vision equipment, color radar, and improved radar warning receivers.

Production C-130Hs manufactured or modified for specialized missions have received the following designations: fourteen (as of 2011) equipped with electronic communications jamming platforms as the EC-130H “Compass Call”; four fitted with skis for Arctic operations as the LC-130H; twenty-four (as of 2011) modified to support Special Operations as the MC-130H “Combat Talon II”; at least one converted to permanent flight test operations as the NC-130H; forty-five (as of 2001) converted as combat crew trainers as the TC-130H; twenty-eight (as of 2011) equipped for command and control and helicopter in-flight refueling to support Special Operations as the MC-130P “Combat Shadow”; and thirteen (as of 2011) converted to side-firing gunships as the AC-130U “Spectre II.”

A combination of factors — the demise of the Advanced Medium STOL Transport (AMST) program in late 1979 (see YC-14 and YC-15, below), strategic logistical emphasis placed on the mission of the McDonnell Douglas C-17, and attrition of the existing C-130E/H fleet — established the need to develop a second-generation Hercules. The C-130J “Super Hercules,” which flew for the first time in April 1996, effectively brings the design up to the current state-of-the-art in terms of systems, aerodynamics, and structure: fully integrated digital flight systems reduce minimum crew from five to three; high-lift NASA airfoils, a boundary-layer control system, and new 4,700-shp Roll-Royce engines driving six-bladed scimitar-type propellers dramatically improve STOL performance and overall aerodynamic efficiency; and composite mate-



AC-120H with the 16th Special Operations Wing based at Hurlburt Field in Florida. The H models have been augmented by the AC-130U, which has twice the munitions capability.





**Lockheed C-130J.** C-130J attached to Air Force Reserve Command seen taking off. New C-130Js, along with C-130Hs, are expected to form the major component of the USAF's tactical airlift capability for the foreseeable future.

rials in primary airframe structures reduce weight, increase airframe life, and enable all fuel to be carried internally. Added together, these improvements give the C-130J a 40 percent increase in range, a 21 percent higher maximum speed, and a 41 percent shorter takeoff roll. As of April 2011, the USAF has taken delivery of 89 C-130Js, with 79 still on order, and since 2004, the contract has been amended to include the newer C-130J-30s with a 15-foot fuselage stretch. As with previous variants, a number of the C-130Js have been earmarked to be completed for specialized duties as the KC-130J (helicopter in-flight refueling), HC-130J Combat King II (personnel recovery and in-flight refueling), MC-130J Combat Shadow II (Special Operations support), and WC-130J (weather reconnaissance).

The operational record of the C-130 in USAF, USAFR, and ANG service is long and varied. Between 1956 and 1962, production C-130As and Bs replaced C-119s in troop carrier wings (tactical airlift wings [TAW] after 1967), and amazingly, for the past 50 years, C-130 variants have been, and remain to this day, the USAF's principal type of tactical transport. In the Cold War/World War III scenario, C-130 units dispersed among bases in the U.S., Europe, and Asia were poised to move entire Army divisions as a counter to the Soviets and their Communist allies. Ski-equipped C-130Ds also displaced C-124s in Operation Deep Freeze (Antarctica), and as deliveries of longer-range C-130Es got underway in 1962, the Hercules' role was expanded from purely tactical to logistical support within the newly created Military Airlift Command (MAC). From 1965 to 1972, USAF C-130As and Bs assigned to TAWs operating out of Japan, Okinawa, and the Philippines provided primary tactical support for American combat operations in South Vietnam and Laos. Specialized variants (RC-130A/B and WC-130B) supplied vital intelligence and weather information. And during the same timeframe, the Hercules confirmed its versatility in specialized combat roles when AC-130A gunships began flying night interdiction sorties out of South Vietnam and Thailand and MC-130E Combat Talons were first employed in special operations.

In the early 1970s, after American involvement in Vietnam ended, most USAF C-130As and Bs were transferred to USAFR and ANG units or to foreign air forces. C-130Es, augmented by C-130Hs from 1974, continued in frontline USAF tactical, logistical, and special operations

units, although many, especially older C-130Es, were transferred to USAFR and ANG squadrons or withdrawn during the early 1990s following the end of the Cold War. Deliveries of C-130Js to operational units commenced in 1999, and the last C-130Es are due to be retired from reserve and ANG service by the end of 2011. At this reading, there are approximately 449 C-130 variants on the USAF inventory, which include 102 assigned to USAFR and 181 to ANG.

*Naval Variants:* Although the Marines evaluated two C-130As in 1956 and 1957 as in-flight tankers and tactical transports, the first actual naval variants were six C-130Bs equipped for search and rescue that entered service with the Coast Guard between 1959 and 1961 under the designation R8V-1G, re-designated HC-130B in mid-1962. The Navy acquired four ski-equipped C-130Bs in 1960 for Antarctic operations with VXE-6 as the UV-1L, which were later re-designated LC-130F. Forty-six C-130Bs with in-flight refueling capability ordered by the Marines in 1960 initially entered service as the GV-1 but were re-designated KC-130F in 1962. The Navy acquired eleven C-130Es in two batches: seven in 1962 for Fleet Logistics Support squadrons (VR), initially as the GV-1U but later re-designated C-130F; and in 1965, four equipped for communication relay and logistical support of the Fleet Ballistic Missile Submarines (FBM) under the designation C-130G (later EC-130G), one of which was later reassigned to the Blue Angels as the TC-130G (and since replaced by a Marine KC-130T known as “Fat Albert”). During 1973 the Navy ordered the first of 18 EC-130Q communication relay aircraft (based on C-130H) to augment existing EC-130Gs in the FBM program.

The Coast Guard has progressively expanded its C-130 fleet, taking delivery of an ex-USAF EC-130E in 1965 to calibrate long-range navigation equipment, then from 1968 to 1988, accepting 30 HC-130Hs, of which 18 were transferred from ex-USAF stocks. As of 2011, the Coast



One of eleven C-130Es acquired by the Navy in 1962, initially as the GV-1U but changed to C-130F. This example was assigned to VR-21 at NAS Barber's Point, Hawaii.

Guard has also added six HC-130Js that are equipped for long-range search and rescue, presumably to replace its older HC-130Hs. The Marines have over time replaced some of their older KC-130Fs with C-130H tanker variants, 14 in 1972 as the KC-130R and 10 in 1983 as the KC-130T (upgraded avionics). In 2004 the Marines took delivery of their first KC-130J, which is slated to start replacing the KC-130Fs that are still in service. Marine KC-130Js have the added feature of a Weapons Mission Kit capable of launching Hellfire missiles or precision munitions.

In addition to C-130s delivered to the American military branches, approximately 2,400 in all five major variants (A–J) have been exported to the air forces of no less than 59 foreign nations, both as new purchases under production contracts and transfers of ex-U.S. military aircraft under various Military Assistance (MAP) programs. Besides military sales, Lockheed has also marketed civil Hercules versions since 1964, 22 as the L-100 (based on C-130E), 20 as the L-100-20 (based on C-130H), and 58 of a stretched version known as the L-100-30.

## Convair C-131/VT-29 (R4Y) Samaritan—1954

### Technical Specifications (C-131A [C-131D])

Type: Medical evacuation, passenger, and cargo transport.

Manufacturer: Convair Div., General Dynamic Corp. San Diego, California.

Total military versions: 312 (256 USAF; 56 USN, USMC, and USCG), not including 191 used solely as T-29 trainers.

Capacity: Crew of three plus 40 passengers, 27 medical litters, or 18,000 lbs. of cargo.

Powerplants: Two 2,400-hp [2,500-hp] Pratt & Whitney R-2800-97 [-103W] *Double Wasp* 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard hydromatic, constant-speed propellers.

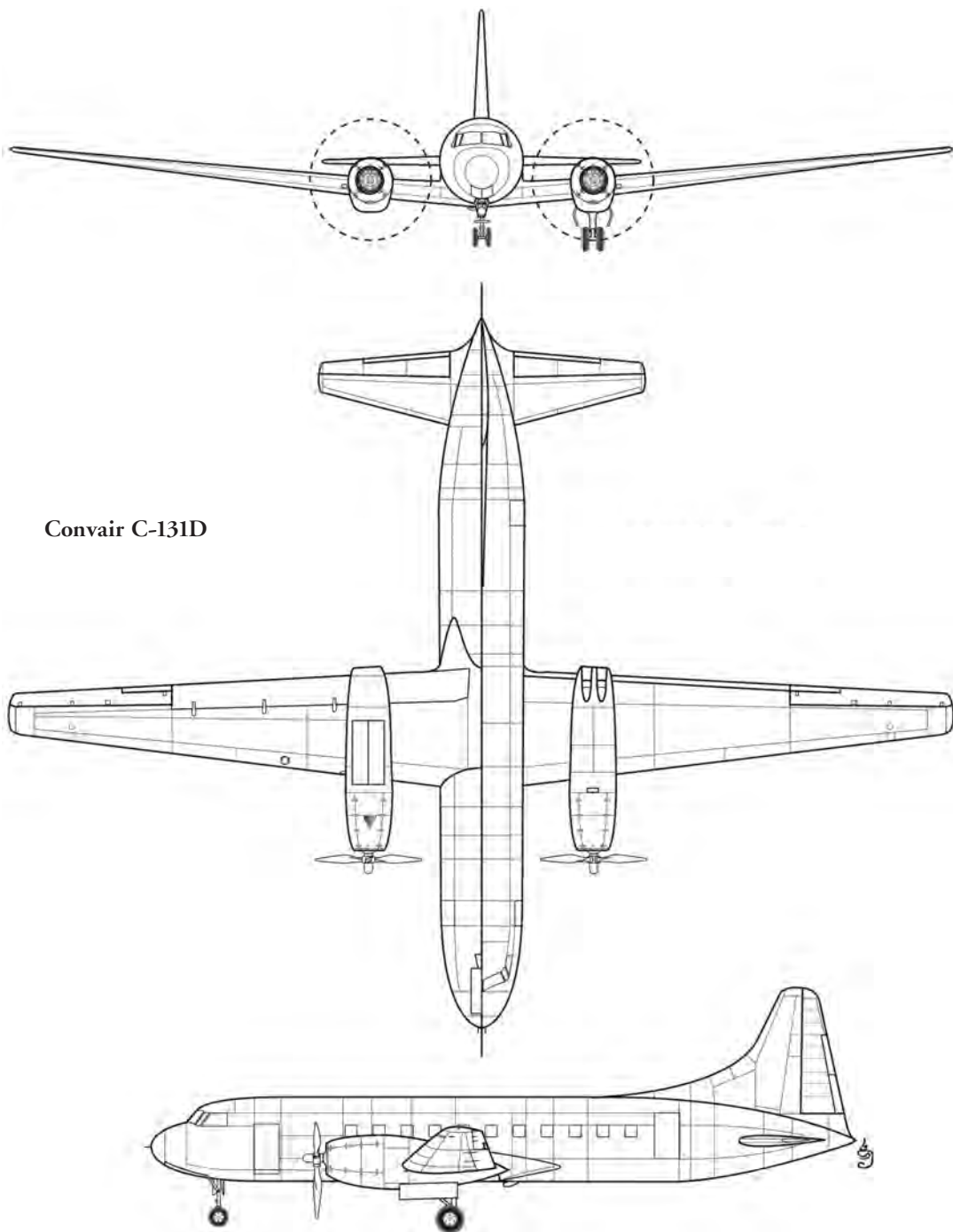
Performance: Max. speed 315-mph [337-mph], cruise 280-mph [299-mph]; ceiling 16,000 ft. [24,900 ft.]; range 1,200 mi. [1,300 mi.].

Weights: 25,445 lbs. [31,305 lbs.] empty, 42,500 lbs. [52,414 lbs.] max. takeoff.

Dimensions: Span 91 ft. 9 in. [105 ft. 4 in.], length 74 ft. 8 in. [79 ft. 2 in.], wing area 817 sq. ft. [920 sq. ft.].

Planned as an intermediate range replacement for the DC-3, Convair introduced its 40-passenger CV-240 to civil airliner service in 1948, followed by the larger 52-passenger CV-340 in 1952, and finally, by the improved CV-440 in 1956, eventually selling 442 examples worldwide before production ended in the mid-1950s. The first military variant based on the CV-240, the XAT-29 (re-designated XT-29), was tested by the USAF in 1949 as an unpressurized navigator trainer and led to a production contract for 46 examples as the T-29A. Succeeding USAF orders resulted in delivery of 317 pressurized CV-240 trainer variants between 1952 and 1953: 105 navigator trainers as the T-29B, 119 navigator trainers with uprated R2800-99W engines as the T-29C, and finally, 93 bombardier trainers as the T-29D. Later in their careers, a number of T-29 variants were re-designated after being modified to serve as personnel or staff transports: 26 with 25-seat interiors as the VT-29A; 60 with 32-seat interiors as the VT-29B; two with 25-seat interiors as the VT-29C; and 46 with 25-seat interiors as the VT-29D. A turboprop-powered T-29E was considered in the mid-1950s but never built.

The USAF ordered the first pure transport variants in 1953, 26 aircraft based upon the CV-240 airframe that were delivered in 1954 as the C-131A. Under the specification, they could be configured either as 27-litter air ambulances, 37-passenger personnel transports, or combinations thereof. C-131As retained the right side integral stairs forward of the wing seen on CV-240 airliners but added a large cargo door for loading of medical litters on the port side aft. When operated as an air ambulance, the type was carried as an MC-131A, though the prefix





**One of 14 CV-340s with VIP interiors delivered to the USAF in the late 1950s as the VC-131D. The paint scheme on the example shown indicates assignment to one of MAT's Special Mission Transport Squadrons.**

never became official, however, a small number did receive designation changes after being modified for specialized duties, several dedicated staff transports as the VC-131A and two equipped for airways (navigation aids) calibration as the AC-131A. In series of contracts awarded between 1953 and 1957, the USAF acquired 71 more transport versions based upon the larger CV-340 airframe: 36 initially set up for airborne electronics testing as the C-131B but later retrofitted with 48-seat interiors; two flying testbeds for Allison YT-56 turboprop engines as the YC-131C; 16 with 44-seat interiors and uprated -103W engines as the C-131D; and 17 with VIP interiors as the VC-131D. In later service, six C-131Bs equipped for missile tracking and nose cone recovery became the JC-131B and one allocated to permanent testing the NC-131B. A C-131B equipped with a gunsight and a side-firing 7.62-mm rotary minigun was used for early gunship experiments at Eglin AFB in 1964. During 1956 and 1957, the USAF accepted a final batch of 15 aircraft based upon the CV-440 standard, 11 of which entered service with SAC as ECM trainers under the designation C-131E (later re-designated TC-131E), plus five reconfigured for airways testing for the CAA (later FAA) as the RC-131G.

Although C-131s are known to have remained in USAF service for over 30 years, there is surprisingly little information about their operational assignments. Historical sources suggest that as deliveries commenced in 1954, the vast majority were assigned to MATS, either to aeromedical squadrons as air ambulances or to special mission transport squadrons (MTC) as personnel transports. The MTCs appear to have functioned like a short-haul military airline, transporting military personnel and VIPs whenever and wherever needed. After 1962, C-131s continued to operate in much the same role with MAC, and others were attached to various USAF commands as VIP staff transports. Most C-131s had been retired from USAF service by the late 1970s, however, a few are reported to have been retained as support transports for ANG wings until 1990.

*Naval Variants:* In 1955 the Navy took delivery of 36 CV-340 models, identical to the 44-seat C-131D, and placed them in service with Fleet Logistics Support Squadrons (VR) under the designation R4Y-1. One later modified with a VIP sleeper interior became the R4Y-1Z.





Identical to 44-seat USAF C-131D personnel transports, the Navy took delivery in 1955 of 36 R4Y-1s, which served a similar function within Fleet Logistics Support Squadrons.

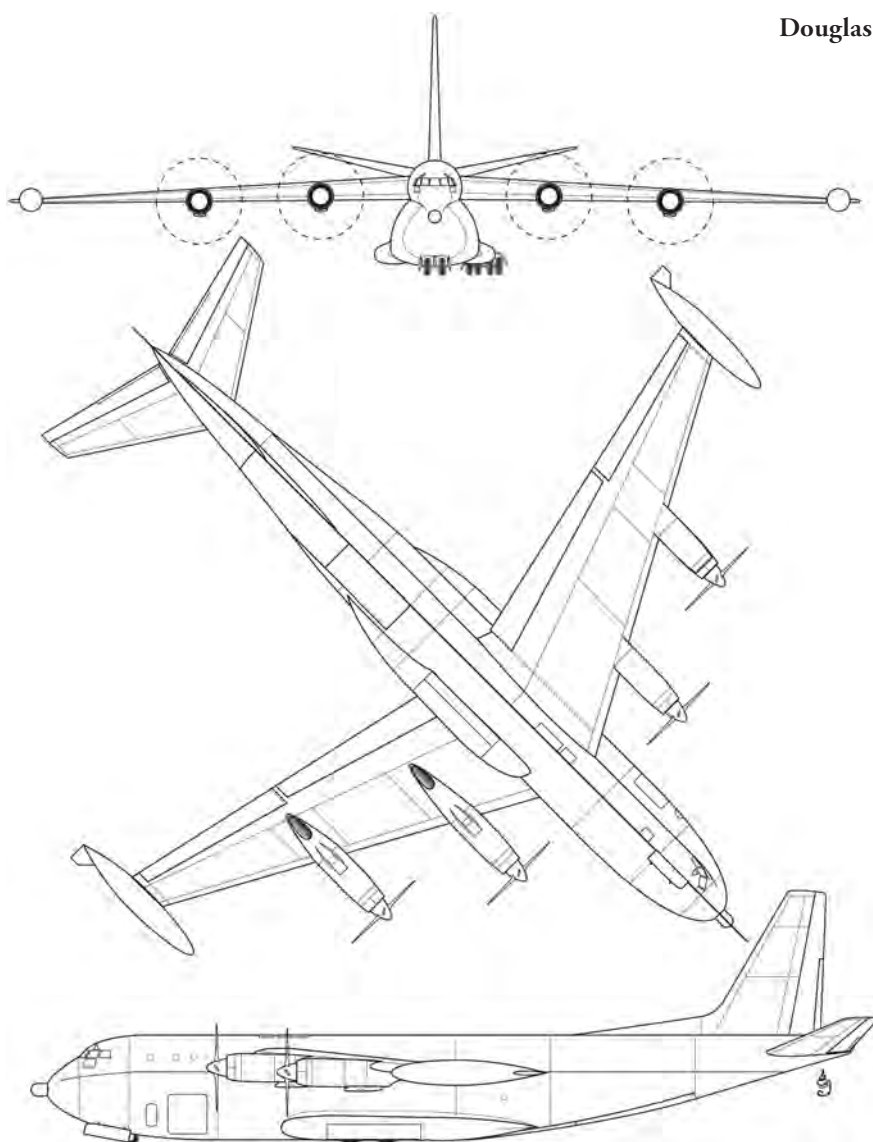


This Marine R4Y-2 was one of two C-131E based upon the CV-440 Metropolitan airframe, transferred from the USAF in 1958. In 1962, the designation was changed to C-131G.

Several R4Y-1s were assigned to the Marines, one to HQ in Washington, D.C., and the other two to FMF commands on each coast. Two C-131Es (CV-440s) originally procured by the USAF entered Navy service in 1958 as the R4Y-2. When the tri-service system went into effect in mid-1962, R4Y-1s and -2s were re-designated the C-131F and C-131G, respectively. Of 17 ex-USAF C-131As transferred to the Coast Guard in 1976, eight were re-designated HC-131A after undergoing extensive overhauls and avionics upgrades in preparation to fly search and rescue missions. Most Navy and Marine C-131s had been withdrawn from the active inventory by the late 1970s, while the Coast Guard HC-131As served until 1983.

### Douglas C-132 (turboprop proposal, canceled)

Douglas C-132





Full-scale mockup of Douglas XC-132 at Douglas plant in mid 1950s. Developed in parallel with the more conservative C-133, the project remained under consideration in both tanker and ICBM-carrying versions until being canceled in the late 1950s.

## Douglas C-133 Cargomaster —1956

### Technical Specifications (C-133B)

Type: Long-range strategic airlift transport.

Manufacturer: Douglas Aircraft Co., Long Beach, California.

Total military versions: 50 (USAF).

Capacity: Crew of six plus 200 troops or 110,000 lbs. of cargo.

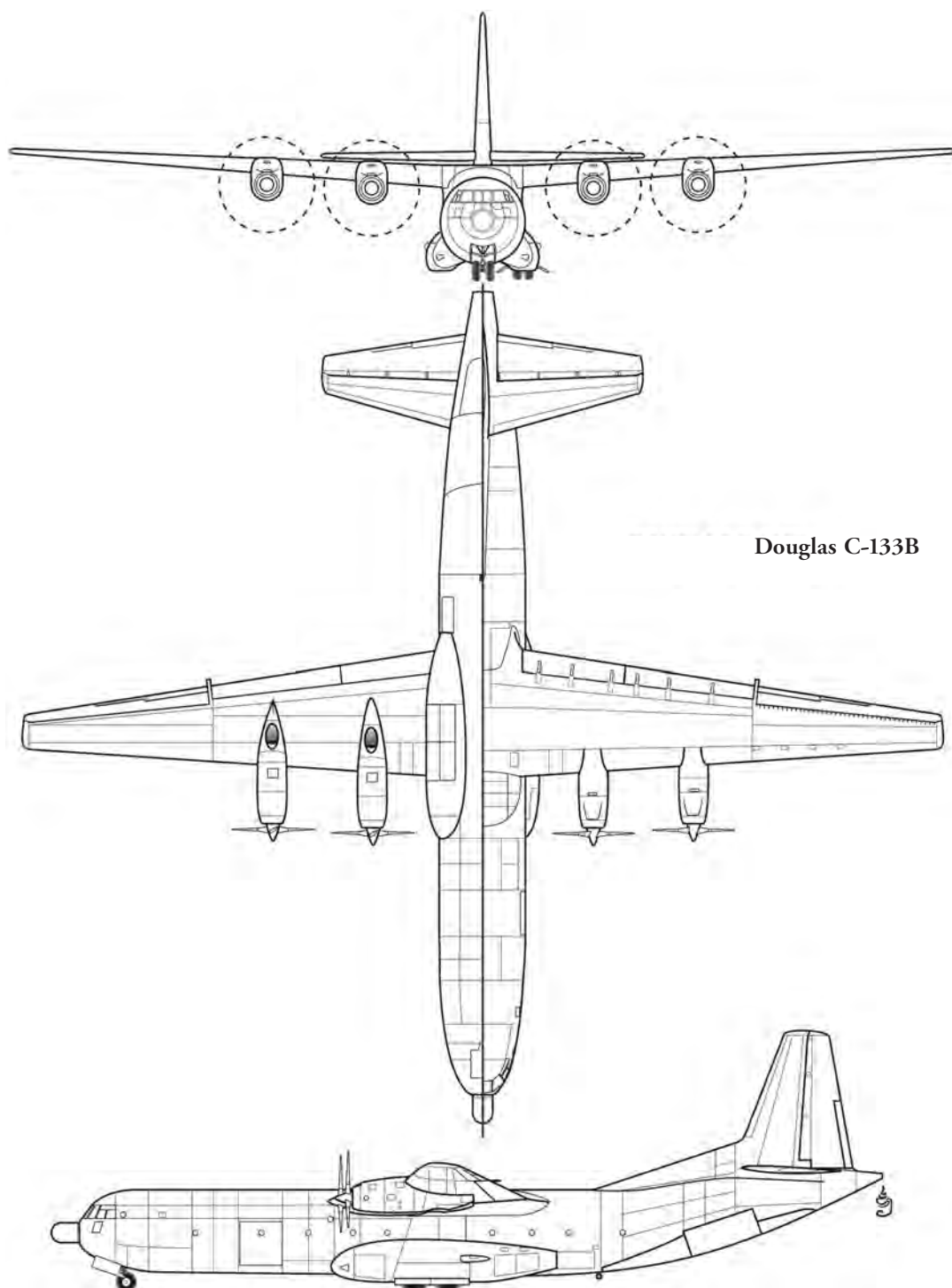
Powerplants: Four 6,950-shp Pratt & Whitney T-34-P-9W turboprop engines driving three-bladed Curtiss Electric fully feathering, reversible-pitch propellers.

Performance: Max. speed 359-mph, cruise 322-mph; ceiling 32,300 ft.; range 4,258 mi.

Weights: 109,417 lbs. empty, 275,000 lbs. loaded, 286,000 lbs. max. takeoff.

Dimensions: Span 179 ft. 8 in., length 157 ft. 6 in., wing area 2,673 sq. ft.

Although the USAF considered several large turboprop-powered, long-range transport designs during the early 1950s (i.e., Boeing C-127 and Douglas C-132), the Douglas C-133 Cargomaster stands as the only one to actually be built and placed in production. In early 1953, after deciding against a pressurized version of the C-124, Air Material Command (AMC) gave Douglas the go-ahead to proceed with detailed engineering work on its proposed model 1333



**Douglas C-133B**



**MATS C-133A seen at Dover AFB, Delaware, while assigned to the 1st Air Transport Squadron. Objects in the foreground appear to be fuel bladders.**

under the designation C-133. On top of being powered by 6,000-shp Pratt & Whitney T-34-P-7W turboprop engines, the final design emerged with a high-wing configuration that included a truck height rear-loading ramp as seen on tactical transports like the C-123 and YC-130. Recent operational experience with the C-124 had shown that its elevated cargo deck (13 ft.) imposed serious restrictions on the length and height of out-sized loads. Equally important, the power available from turboprop engines not only offset the added weight of a pressurized fuselage but promised measurable improvements in speed, range, operational ceiling, and payload. Large, double-slotted flaps extending over 75 percent of wingspan would keep landing and takeoff speeds low enough to allow operations from existing runways. In October 1953, after reviewing the detailed design, AMC was sufficiently confident to award Douglas a contract for an initial batch of 12 production aircraft as the C-133A, and in mid-1954, after a mockup inspection, increased the order to 29 aircraft.

The first C-133A (no experimental prototype) completed its maiden flight on April 23, 1956, flying from Long Beach to Edwards AFB for official acceptance trials. Production models began entering operational service during the middle of 1957, and the last of 32 C-133As ultimately ordered was delivered to the USAF in 1959. While deliveries of C-133As were still ongoing, AMC directed Douglas to develop a new version that incorporated a pair of side-opening rear cargo doors, uprated -9W engines, and other changes for the express purpose of carrying fully assembled ballistic missiles like the Thor IRBM (65 ft. × 8 ft.) and Atlas ICBM (85 ft. × 10 ft.), with the result that the USAF procured 18 more aircraft from mid-1959 to late 1961 as the C-133B. Altogether, Douglas built 52 Cargomaster airframes but retained one C-133A and one C-133B in civil registration for test and development purposes.



C-133As commenced operational service with the Atlantic Division of MATS in the 39th Air Transport Squadron (ATS) at Dover AFB, Delaware in August 1957, followed by establishment of a second unit with the Pacific Division in the 84th ATS at Travis AFB, California in late 1958. As C-133Bs began arriving for service with the 84th ATS at Travis in April 1959, its C-133As were eventually transferred to Dover where they were reformed as the 1st ATS as of May 1960. During their early careers, Cargomasters demonstrated their airlift capabilities in a number of noteworthy flights: in January 1958, two C-133As set a transatlantic non-stop record by hauling an 80,000 lb. load from Dover to Chateauroux, France; in September 1958, over a 15-day period, five C-133As moved a record 600,000 lbs. of cargo from Dover to Burtonwood, England; and in December 1958, a C-133A set a new weight-to-altitude record when it flew 117,900 lbs. to 10,000 ft. In May 1959, a C-133 established an unofficial distance record of 5,150 miles between Tachikawa AB, Japan and Travis AFB.

During their term of service, C-133s were used worldwide by MATS (MAC after 1965) to carry any load too large or too heavy for other types of aircraft. At the peak of ICBM development, C-133Bs moved hundreds of Atlas, Titan, and finally, Minuteman missiles to and from their operational bases. They also supported NASA by transporting launch boosters in the Mercury, Gemini, and Apollo space programs and moving entire satellite tracking stations to places like Ascension Island, Madagascar, and Brazil. From 1965 to 1970, as the Vietnam War escalated, C-133s, working alongside C-124s, flew hundreds of sorties into the combat theater, carrying vehicles and other equipment that was too large for the newer C-141s. One of its standard missions involved redeployment of helicopters between Vietnam and repair depots in the U.S. Of nine fatal C-133 crashes recorded between 1958 and 1970, most were attributed to the discovery of lethal stall characteristics encountered while the aircraft was in either a takeoff-to-climb or approach-to-landing mode. By 1970, due to extensive operational use, most of MAC's



MAC C-133B on display as a static exhibit at the Rantoul National Aviation Center, formerly Chanute AFB, in Illinois. Bs, specifically adapted to carry ICBMs, moved hundreds of missiles to and from their operational bases.

C-133 fleet had exceeded the projected 10,000-hour airframe life (some had logged as much as 19,000-hours) and were showing serious evidence of structural fatigue. The USAF began the process of phasing-out C-133s just as soon as new Lockheed C-5As began entering service with MAC in mid-1970, and the last examples had been retired by the end of 1971. Most were placed in storage at Davis Monthan AFB, Arizona and later scrapped, though at least five were sold surplus and placed on the civil registry. The last known Cargomaster flight took place in August 2008 when a civil C-133A (ex-AF Ser. No. 56-1999) was flown from Alaska to Travis AFB to be restored as a museum exhibit. Three C-133As and two C-133Bs are known to be preserved in air museums (for details, see <http://en.wikipedia.org/wiki/C-133>).

## Boeing C-135, C-137, and C-18 Stratolifter/Stratoliner — 1959

### Technical Specifications (C-135A [VC-137C])

Type: Long-range strategic airlift transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 63 (USAF), not including approximately 800 tanker, AWACs, and command and control versions.

Capacity [VC-137C]: Crew of four plus 126 passengers [VIP interior for 22 passengers], 75 troops, or 60,000 lbs. [54,000 lbs.] of cargo.

Powerplants: Four Pratt & Whitney J-57-P-59W Turbojet engines, each rated at 13,750 lbs./s.t. [TF-33-PW-102 turbofan engines, each rated at 18,000 lbs./s.t.].

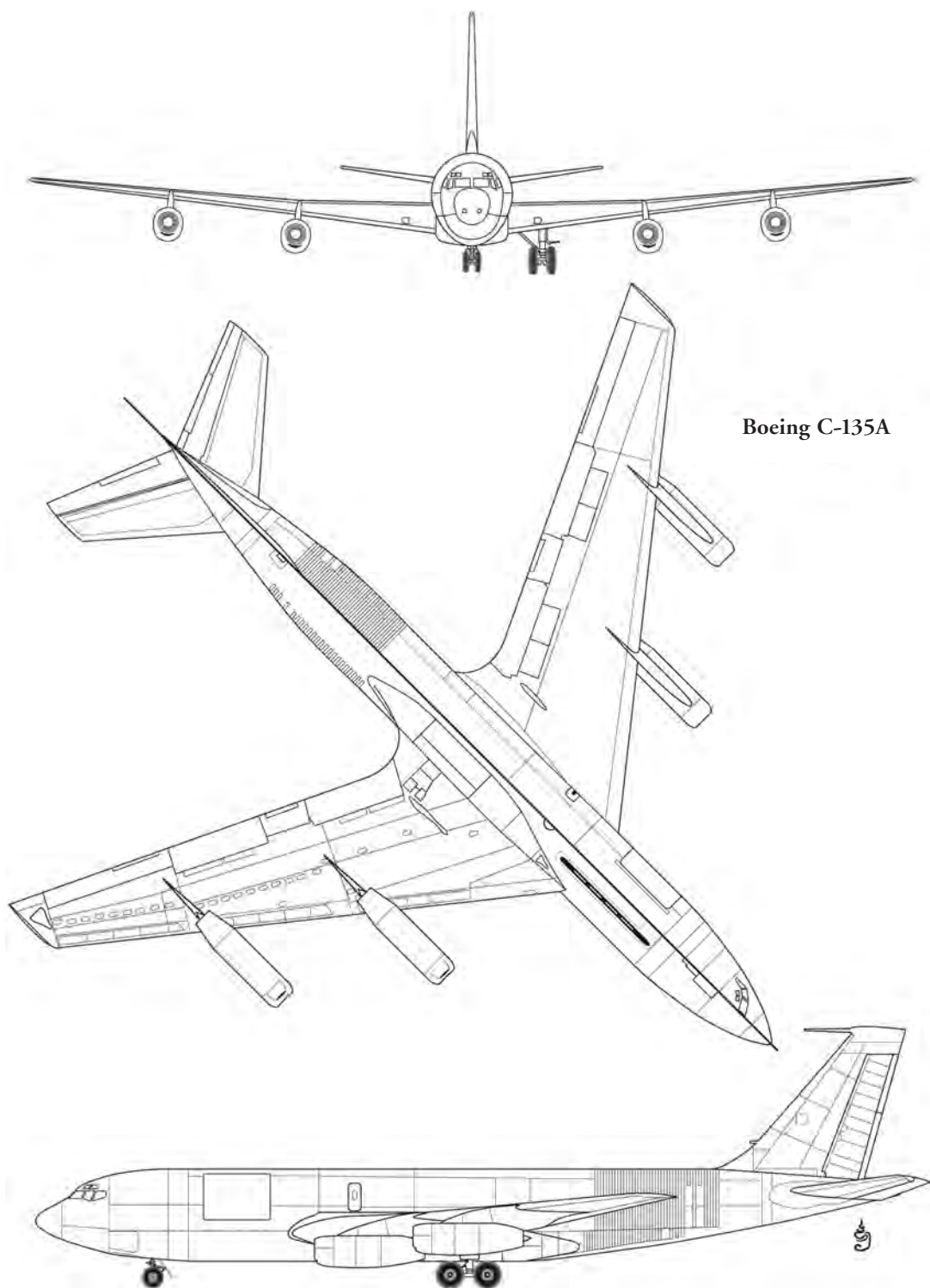
Performance: Max. speed 600-mph [627-mph], cruise 552-mph [600-mph]; ceiling 40,000 ft. [50,000 ft.]; range 4,000 mi. [7,610 mi.].

Weights: 109,000 lbs. [98,466 lbs.] empty, 297,000 lbs. [327,000 lbs.] max. takeoff.

Dimensions: Span 130 ft. 10 in. [145 ft. 9 in.], length 136 ft. 3 in. [152 ft. 11 in.], wing area 2,433 sq. ft. [3,010 sq. ft.].

It is probably safe to say that the Boeing model 367-80, when it flew in July 1954, became the single most influential jet transport design of the mid-20th century. It originally materialized as a proof-of-concept demonstrator for the KC-135 (model 717), the USAF's first jet-propelled aerial refueling tanker, and an enlarged passenger version that Boeing planned to offer the airlines (model 707 series). In 1954, after eliminating Lockheed's proposed model L.193 from consideration, Air Material Command (AMC) awarded Boeing a contract for the first 29 of 732 KC-135A Stratotankers ultimately delivered between 1957 and 1965, followed by 17 more aircraft with TF-33-P5 turbofan engines as the KC-135B. In 1960, parallel to the Stratotanker, the USAF also ordered 15 non-tanker variants as the C-135A Stratolifter to be used as high-priority logistical transports which could be outfitted for personnel, cargo, or combinations of both, with the first example flying on May 19, 1961. Three KC-135As stripped of their refueling equipment and tanks also later became C-135As. While deliveries of C-135As were pending, the USAF gave Boeing a follow-up order for 30 more transport variants as the C-135B which retained the smaller fuselage and wing planform of the model 717 but featured the TF-33 (JT3D) turbofan engines and wide-span tailplanes of the model 707.

During the course of overhauls, many C-135As were re-powered with TF-33-PW-102 turbofan engines and given wide-span tailplanes, and several, reconfigured with VIP interiors, became the VC-135A. C-135Bs removed from logistical duties and converted to special uses were re-designated as follows: two fitted with large tracking radars in 1979 became the EC-135B; two equipped for permanent satellite communication tests became the NC-135B; ten equipped for weather reconnaissance became the WC-135B; and two in 1993 converted for disarmament



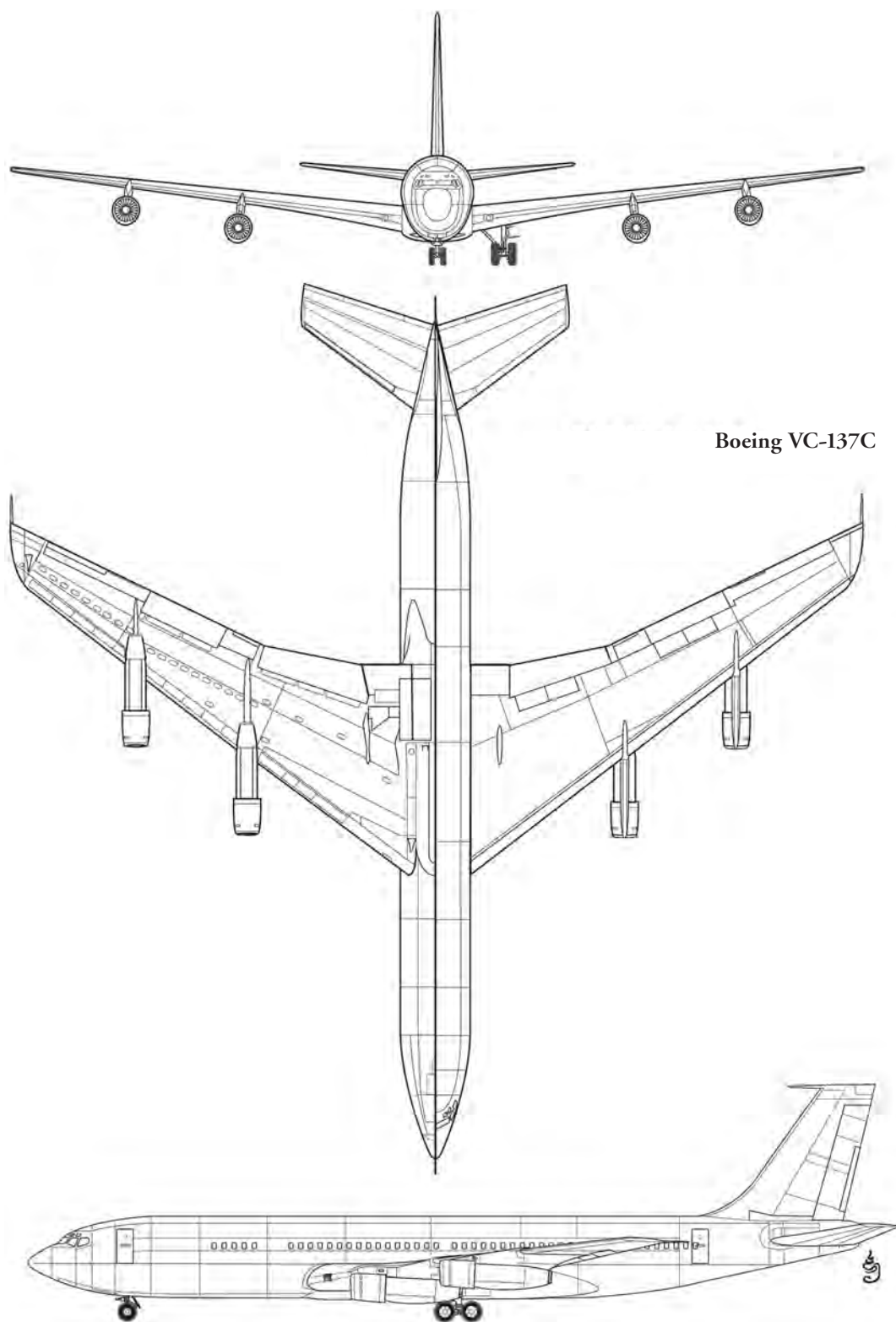


**Nearly new C-135A serving with MATS in the early 1960s. C-135As were the first pure jet USAF transports to operate in a long-range logistics role and could be configured for cargo, troops, or medical evacuation.**

observation flights over the former Soviet Union became the OC-135B. Three WC-135Bs that reverted to transport status in the 1970s became the C-135C, one being assigned to the Secretary of the Air Force and Air Force chief of staff as a VIP transport and another, known as the “Speckled Trout,” to Edwards AFB, California as an airborne equipment test platform. Twelve model 717 airframes sold to France in 1964, convertible as either tankers or troop carriers, were known as the C-135F.

During 1959, AMC (Air Force Logistics Command [AFLC] after 1960) procured three model 707-120s from Boeing under the designation VC-137A Stratoliner to be utilized as command and staff transports. The VC-137A differed from airline versions in having VIP interiors and advanced military communications equipment. Within a few years after entering service, all of these aircraft were retrofitted with TF-33-P5 (JT3D-3) turbofans and re-designated VC-137B. In 1961, as a specially equipped presidential transport (i.e., Air Force One), AFLC acquired a Boeing 707-320B as the VC-137C, with a second VC-137C being added in 1972. The V-prefix was dropped at some interval in the 1970s when these aircraft had been withdrawn from presidential use. Two ex-airline examples purchased, a 707-396C in 1985 and a 707-382B in 1987, also joined the USAF inventory as the C-137C. It is worthy of note that other 707-320B derivatives also served as the airframe/engine component for the E-3 AWACS, E-6 Mercury (airborne command post), and E-8 Joint STARS (surveillance target attack radar system).

Eleven former airline 707-320Bs purchased during the 1980s and later were taken into USAF service under the new series designation C-18. Most were acquired for a variety of specialized roles: three designated C-18A served as crew trainers; one fitted with instrumentation to support the military strategic and tactical relay system (MILSTAR) as the C-18B; and four equipped as advanced range instrumentation aircraft (ARIA) for missile tracking as the EC-18B. Two of the C-18As subsequently became the EC-18D after being converted as cruise missile







**One of the two model 707-320Bs procured for the presidential flight as the VC-137C. Both aircraft came with 22-seat VIP interiors and specialized accommodations for the president.**

mission control aircraft (CMMCA). An ex-airline 707-331 was designated TC-18E following modifications for E-3 aircrew training, plus two second-hand 707-382s, TC-18F for E-6 pilot training.

Starting in 1961, C-135As and Bs entered service with MATS where they began replacing piston-engine C-118s on long-range logical support missions. Depending on the mission, C-135s could be rigged for cargo, 126 troops, or 44 medical litters. The type became operational in time to play an important role in major logistical efforts like the Congo Airlift (1962-1963), the Calcutta, India Arms Supply Mission (1962), and Operation Big Lift (1963). On a routine sortie, a Stratolifter could complete the mission three times as fast as a C-124. During the Vietnam War (1965-1972), C-135s were used for re-supply in and out of Da Nang, Cam Ranh Bay, Tan Son Nhut, as well as U.S. bases in Thailand. When MATS was absorbed by MAC after 1965, C-135Bs outfitted with VIP interiors (as VC-135B) and operated by the 89th Military Airlift Wing at Andrews AFB, Maryland formed the transportation link to Vietnam for presidential staff and senior government leaders. By the time Air Mobility Command (AMC) replaced MAC in June 1992, most C-135s had been replaced by other aircraft or reassigned to more specialized duties, although some 500 KC-135s, having been progressively upgraded, remain in USAF service today. Speckled Trout served until 2006. The VC-137Cs in the presidential fleet were phased out during the mid-1970s, while the VC-135Bs of the 89th MAW were withdrawn during the late 1990s as C-32As (Boeing 757-200) arrived to take their place.

C-138 (reserved for USN but not used)

C-139 (see Lockheed P2V-3Z in Part B)

### Lockheed C-140 Jetstar —1961

#### Technical Specifications (C-140B)

Type: Intermediate range navaid calibration and staff transport.

Manufacturer: Lockheed Aircraft Corp., Marietta, Georgia.

Total military versions: 16 (USAF).

Capacity: Crew of three plus 10 passengers.

Powerplants: Four Pratt & Whitney J-60-P-5 turbojet engines, each rated at 3,000 lbs./s.t.

Performance: Max. speed 573-mph, cruise 507-mph; ceiling 38,000 ft.; range 2,220 mi.

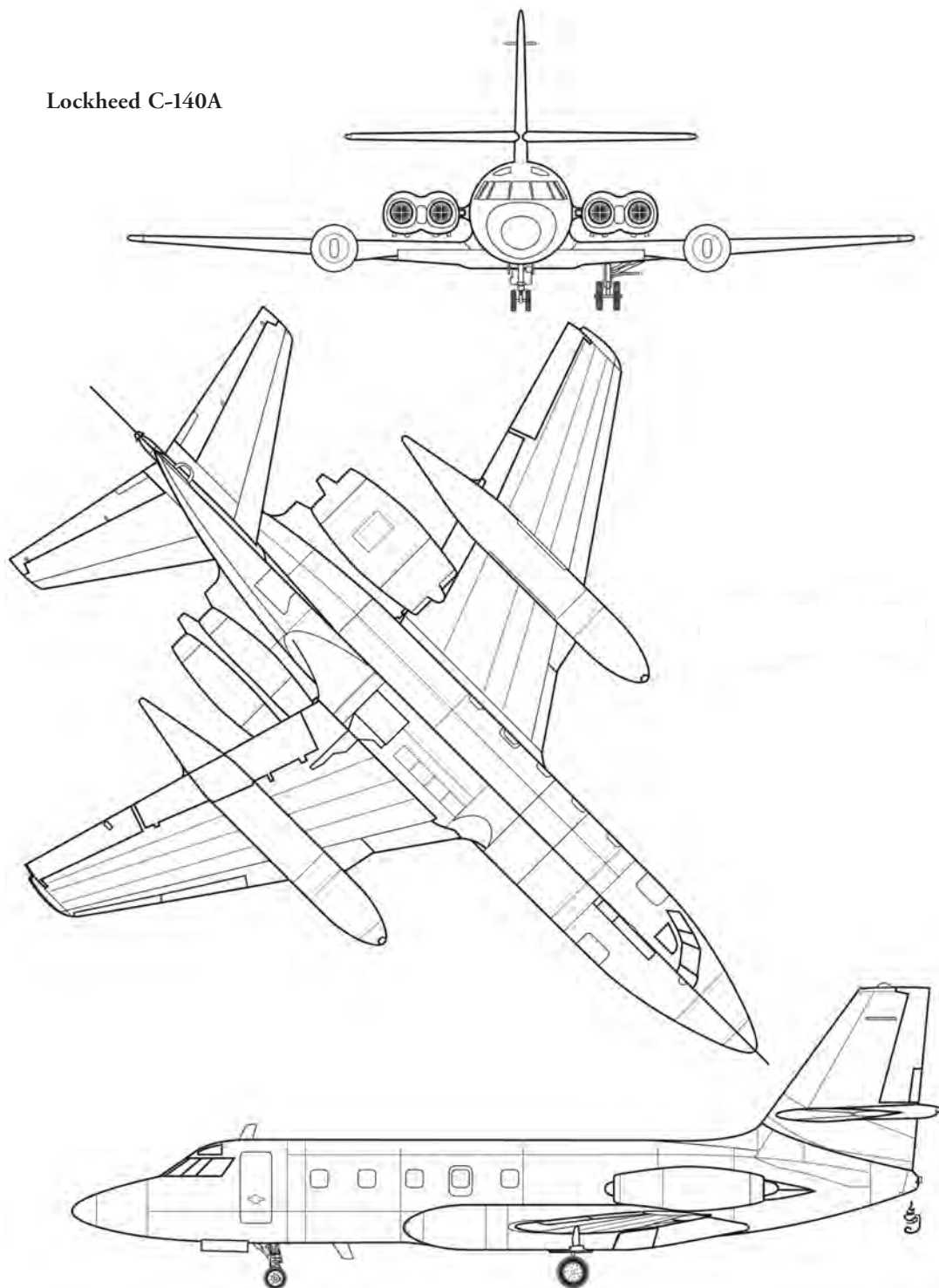
Weights: 22,500 lbs. empty, 40,470 lbs. max. takeoff.

Dimensions: Span 53 ft. 8 in., length 60 ft. 5 in., wing area 542.5 sq. ft.

During the mid-1950s, the USAF invited aircraft manufacturers to submit design proposals for a small jet transport under two separate projects known as UTX (utility trainer experimental) and UCX (utility transport experimental). Lockheed responded to the UTX/UCX requirement in 1956 with the model L-329 Jetstar, a 12-passenger, swept-wing design that would be powered by two nacelle-mounted engines aft of the wings; however, budgetary restraints imposed by other projects prevented Air material Command (AMC) from making a commitment on a prototype. Meanwhile, the company decided to proceed with the program as a private venture,



Navaid calibration C-140A seen in Southeast Asia camouflage scheme serving with the 1866th Flight Checking unit. Last examples withdrawn in the early 1990s.

**Lockheed C-140A**



**VC-140B assigned to the Special Air Mission at Andrews AFB and was used by President Johnson and the first lady between 1964 and 1968.**

with the Jetstar prototype, powered by two British-made Bristol *Orpheus* engines, making its first flight on September 4, 1957. At the time, there were no small jet engines made in the U.S. that generated enough power for an aircraft the size of the Jetstar, however, by 1959, when Lockheed began receiving civil orders, a decision had been made to substitute four recently developed Pratt & Whitney JT12A-2 (J-60-P-5) engines in paired nacelles and add “slipper” tanks on the wings at mid-span to extend range. Another interesting characteristic of the design was a cruciform tail group featuring an all-flying stabilizer and a vertical fin that pivoted up and down for pitch trim. For slow flight, the wing incorporated moveable slats on the outboard panels, double-slotted flaps, plus a ventral speed brake. Ultimately, Lockheed delivered a total of 188 civil Jetstars in three major versions from 1961 to 1978.

In 1958 the USAF considered procuring the Jetstar as the T-40A crew-trainer but opted instead to purchase North American’s smaller and less expensive T-39A Sabreliner (see below). Lockheed’s first military order came in mid-1960 when AMC contracted for delivery of 10 Jetstars in two batches: five intended for calibration of airways navigation aids under the designation C-140A, plus five as utility transports with passenger/cargo convertible interiors as the C-140B. Initial deliveries of C-140Bs commenced in April 1961, followed by C-140As in September. The final USAF Jetstar order came in 1962 for six VIP-configured aircraft as the VC-140B. A Navy order for two Jetstar utility transports, to be designated UV-1 (later C-140C), was canceled prior to delivery.

As C-140Bs began entering service in 1961, they were assigned to MATS and continued with MAC after 1965, but were all subsequently converted to a VIP configuration and transferred to the 1254th Air Transport Wing, Special Air Mission at Andrews AFB, Maryland, where they served alongside the VC-140Bs. Both types were withdrawn during 1986 as Gulfstream C-20As and Gates Learjet C-21As entered service to replace them. All five of the C-140As became operational in late 1961 with the 1866th Flight Checking Flight of the Air Force Communications Service at Scott AFB, Illinois. Since the As were combat-coded aircraft that could routinely be tasked to operate in combat zones, they were painted in the Southeast Asia camouflage scheme during the mid-1960s. The last C-140As were withdrawn during the early 1990s.

## North American Rockwell CT-39 —1960

### Technical Specifications (CT-39A)

Type: Crew-trainer and utility transport.

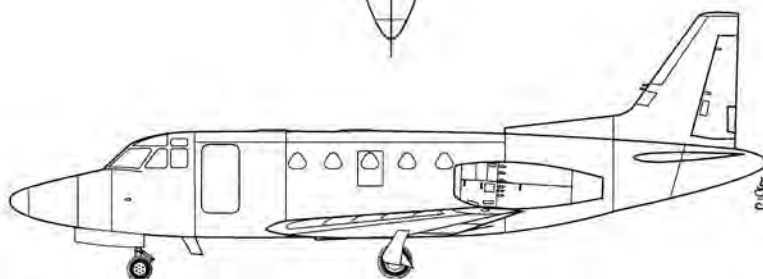
Manufacturer: North American Rockwell Corp., Los Angeles, California.

Total military versions: 205 (149 USAF; 62 USN).

Capacity: Crew of two plus seven passengers or 1,400 lbs. of cargo.



### North American CT-39A





Powerplants: Two Pratt & Whitney J-60-P-3 turbojet engines, each rated at 3,000 lbs./s.t.

Performance: Max. speed 550-mph, cruise 500-mph; ceiling 40,000 ft.; range 2,170 mi.

Weights: 9,257 lbs. empty, 17,760 lbs. max. takeoff.

Dimensions: Span 44 ft. 6 in., length 44 ft., wing area 342.1 sq. ft.

The design of the North American model NA-265 emerged in the mid-1950s as an in-house project that would be offered to the USAF in response to its UTX (utility trainer experimental) requirement. UTX contemplated a small, multi-engine jet that would function primarily as a crew trainer but also serve as a fast utility transport when the need arose. Due to its aerodynamic resemblance to North American's well-known F-86 fighter, the design received the factory name "Sabreliner." As with the Jetstar, in order to avoid ingestion of debris, the Sabreliner's two engines were located in nacelles on the sides of the fuselage aft of the wings. Set at 28-degrees sweepback, the wings featured articulated flaps and nearly full-span automatic slats on the leading edges. The civil NA-265 prototype made its first flight on September 16, 1958, and Air Material Command placed the first military order in January 1959 under the designation T-39A.

Through a series of contracts that followed, the USAF accepted a total of 143 T-39As, plus six T-39Bs specially equipped to function as a radar systems trainers. T-39As and Bs released from training duties and re-configured for cargo or passengers, returned to service as the CT-39A/B. One T-39A modified for electronic systems testing became the NT-39A. The USAF considered procuring a T-39C variant specialized for ECM and strategic bomber training, but none were ordered. As the USAF began the process of upgrading its training fleet during the



Navy CT-39E as shown in 1980 while in service with VR-30. A number of CT-39Gs and Ns are still reportedly on the Navy's active inventory.

late 1970s and 1980s, T-39As and Bs with sufficient airframe life remaining became CT-39A/Bs after being refitted for transport duties, after which they were typically employed as Special Air Mission transports to move high-priority personnel and cargoes. Phase-out of CT-39s from active service began in the mid-1980s as Gulfstream C-20As and Gates Learjet C-21As began arriving to take their place.

*Naval Variants:* In mid-1961 the Navy ordered its first ten Sabreliners as the T3J-1 but changed the designation to T-39D by the time any aircraft were delivered in late 1962. T-39Ds came equipped with either APQ-94 radars for training radar intercept officers (F-4s) or APQ-126 radars for bombardier-navigators (A-6s), and a total of 42 were ultimately accepted by the end of 1963.

The Navy added 20 more Sabreliners to its fleet during 1967: seven ex-civil Sabreliner 40s intended as cargo and personnel transports, initially designated VT-39E but changed to CT-39E; and 13 stretched Sabreliner 60s, purchased new off-the-shelf, as VIP transports under the designation CT-39G. In 1990, the seven CT-39Es were sent to Sabreliner Corp. (Rockwell's successor) where they were rebuilt and fitted with F-16 radar systems, then returned to service as T-39N radar navigation and airborne intercept trainers. At this writing, all T-39Ds have been withdrawn while the CT-39Gs and CT-39Ns reportedly still remain in active Navy service. In addition to military production, North American (later Rockwell International) sold approximately 600 Sabreliners on the civil market in four major variants between 1963 and 1981.

## Lockheed C-141 Starlifter — 1963

### Technical Specifications (C-141A [C-141B])

Type: Long-range strategic and tactical airlift transport.

Manufacturer: Lockheed (Lockheed-Martin after 1993) Aircraft Corp., Marietta, Georgia.

Total military versions: 284 (USAF).

Capacity [C-141B]: Crew of five [six] plus 124 [166] troops, 80 [103] medical litters, or 62,717 lbs. [89,152 lbs.] of cargo.

Powerplants: Four Pratt & Whitney TF-33-P-7 Turbofan engines, each rated at 20,250 lbs./s.t.

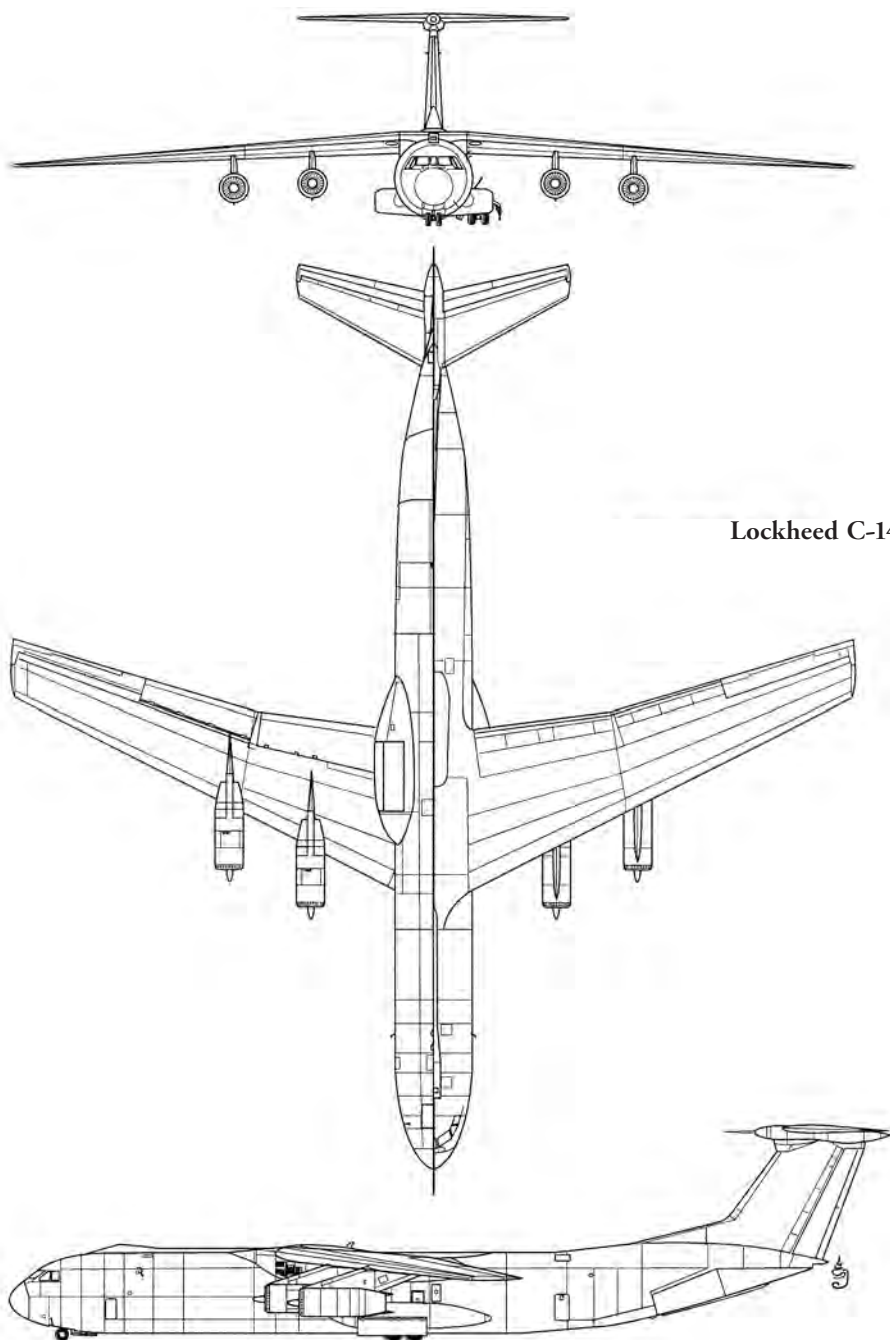
Performance: Max. speed 565-mph, cruise 478-mph; ceiling 51,700 ft. [41,000 ft.]; range 4,155 mi. [3,200 mi.].

Weights: 136,900 lbs. [153,350 lbs.] empty, 323,100 lbs. [342,100 lbs.] max. takeoff.

Dimensions: Span 160 ft., length 145 ft. [168 ft. 4 in.], wing area 3,228 sq. ft.

In order to replace MATS's aging fleet of piston-engine, long-range logistical transports (i.e., C-97, C-118, C-121, and C-124) and augment C-133s already in service, the USAF issued a Specific Operating Requirement (SOR) in May 1960 calling for a pure jet transport that could carry a payload of 60,000 lbs. over an un-refueled range of 4,000 miles with the added tactical capability of dropping supplies or paratroopers in a combat zone. In March 1961, after considering proposals from four major aircraft manufacturers, Air Force Logistics Command (AFLC) selected Lockheed's model L-300 design, awarding a contract for five development aircraft under the assigned designation C-141A. Based upon recent experience gained with the C-130, Lockheed's engineering team evolved a low-sitting, high-wing design that would facilitate rear-loading at truck-height through clamshell doors and a droppable ramp. Wing sweepback was set at 25-degrees, with the four turbofan engines pylon-mounted in underslung nacelles, and the four-wheel main landing gear located in blisters on the fuselage sides that left the cargo floor unobstructed. Other distinguishing features included a T-tail empennage, 1.2-degrees of wing anhedral, and lift spoilers on the upper wing surfaces. The main cargo bay (70-ft. × 10.3-ft.) could be configured to accommodate either 62,717 lbs. of cargo, 138 troops, 124 paratroops, or

80 medical litters. In May 1962, with construction of the C-141A development aircraft underway, AFLC gave Lockheed a definitive contract to deliver 132 production aircraft, and following the maiden flight of first C-141A from Marietta on December 17, 1963, the order was eventually increased to 284 aircraft. Deliveries of production models to the USAF commenced in October 1964 and the last C-141A was accepted in February 1968. During the production run, several



**Lockheed C-141B**



Seen side-by-side, C-141B in the foreground and a C-141A. Note bulge behind the cockpit of C-141B housing the refueling receptacle.

C-141As were built with airframe strengthening that enabled them to carry the 86,207 lb. weight of a Minuteman ICBM. Lockheed also planned to offer a civil version as the L-300 Superstarlifter and completed one demonstrator in 1963 under civil registration (N4141A); however, when no commercial sales materialized, the aircraft was afterward donated to NASA for the use of the Ames Research Center as the NC-141A.

When faced with post-Vietnam budgetary restraints placing explicit limits on acquisition of new transports, Lockheed and AFLC began formulating a program that would add both utility and service life to the USAF's existing C-141A fleet. By adding two plugs to the fuselage, 13 ft. 4 in. forward of the wing and 10 ft. aft, usable interior volume would increase by a factor of 75 percent, and the consequent reduction in range could be offset by adding an aerial refueling boom receptacle on the upper fuselage aft of the cockpit. A contract awarded in mid-1976 authorized Lockheed to implement the planned modifications on a single C-141A, and the YC-141B prototype was rolled-out for flight-testing on March 24, 1977. In a conversion program extending from 1977 to 1982, 270 C-141As returned to service as stretched C-141Bs. With the added interior space, the Bs not only accommodated larger cargoes, but could handle 205 troops, 168 paratroopers, or 103 medical evacuees in litters. In 1994, 13 C-141Bs began operating in conjunction with Air Force Special Operations Command (AFSOC) after being equipped with Special Operation Low-Level II packages that significantly enhanced night flying capabilities and defensive countermeasures. Later still, in 1997, 63 of the lowest-time C-141Bs in the USAF inventory became C-141Cs following an avionics upgrade that involved installation of digital flight



MAC C-141A in new low-visibility paint scheme, probably in the late 1970s while the bulk of the USAF's Starlifter fleet was being converted to the B standard.



MAC C-141B in older camouflage pattern. At some sacrifice in range, the B could carry a 43 percent heavier payload. Final examples retired from USAFR and ANG in 2006.



displays (i.e., “glass cockpits”) that interfaced with an all-weather flight control system and enhanced GPS navigation system.

Due to the surge in logistical requirements generated by the escalation of U.S. military involvement in Southeast Asia, C-141As became operational with MATS in the 1501st ATW at Travis AFB, California in April 1965 while the type was still undergoing service testing. In January 1966, all C-141As were transferred to MAC and reformed into newly established Airlift Wings (AW), where, by end of 1968, they were equipping eight AWs based in the continental U.S. that serviced a worldwide logistical network. Between 1965 and 1972, Starlifters made flights into South Vietnam almost daily, bringing in troops, equipment, and military material, and returning medical evacuees to the U.S. In their early years of service, C-141As became the first type of pure jet transport from which Army paratroopers jumped and the first type to land in the Antarctic.

Converted C-141Bs began entering service with MAC in December 1979 and the transition to B models was completed during 1982. Although the USAF began the process of transferring Starlifters to reserve and ANG squadrons in 1987, these units remained under overall MAC control (Air Mobility Command [AMC] after June 1992) in terms of mission tasking. During the Gulf War (1991–1992), C-141Bs of the 438th AW out of McGuire AFB, New Jersey were the first American military aircraft to arrive in Saudi Arabia and thereafter provided the bulk of logistical support to the war effort, flying a total of 7,047 sorties during which time they carried 41,400 military personnel and transported 139,600 tons of cargo. By the mid-1990s, due to their high airframe times, the USAF planned to replace all of AMC’s Starlifters with McDonnell-Douglas C-17As by the end of 2003; however, the last C-141Bs did not actually leave active AMC service until September 2004, and the final examples in USAFR and ANG units were not retired until mid-2006. NASA’s NC-141A is currently in storage.

## Ling-Temco-Vought C-142 —1964

### Technical Specifications (XC-142A)

Type: V/STOL tactical transport.

Manufacturer: Ling-Temco-Vought Corp., Dallas, Texas.

Total military versions: 5 (Tri-Service).

Capacity: Crew of two plus 32 troops, 24 medical litters, or 80,000 lbs of cargo.

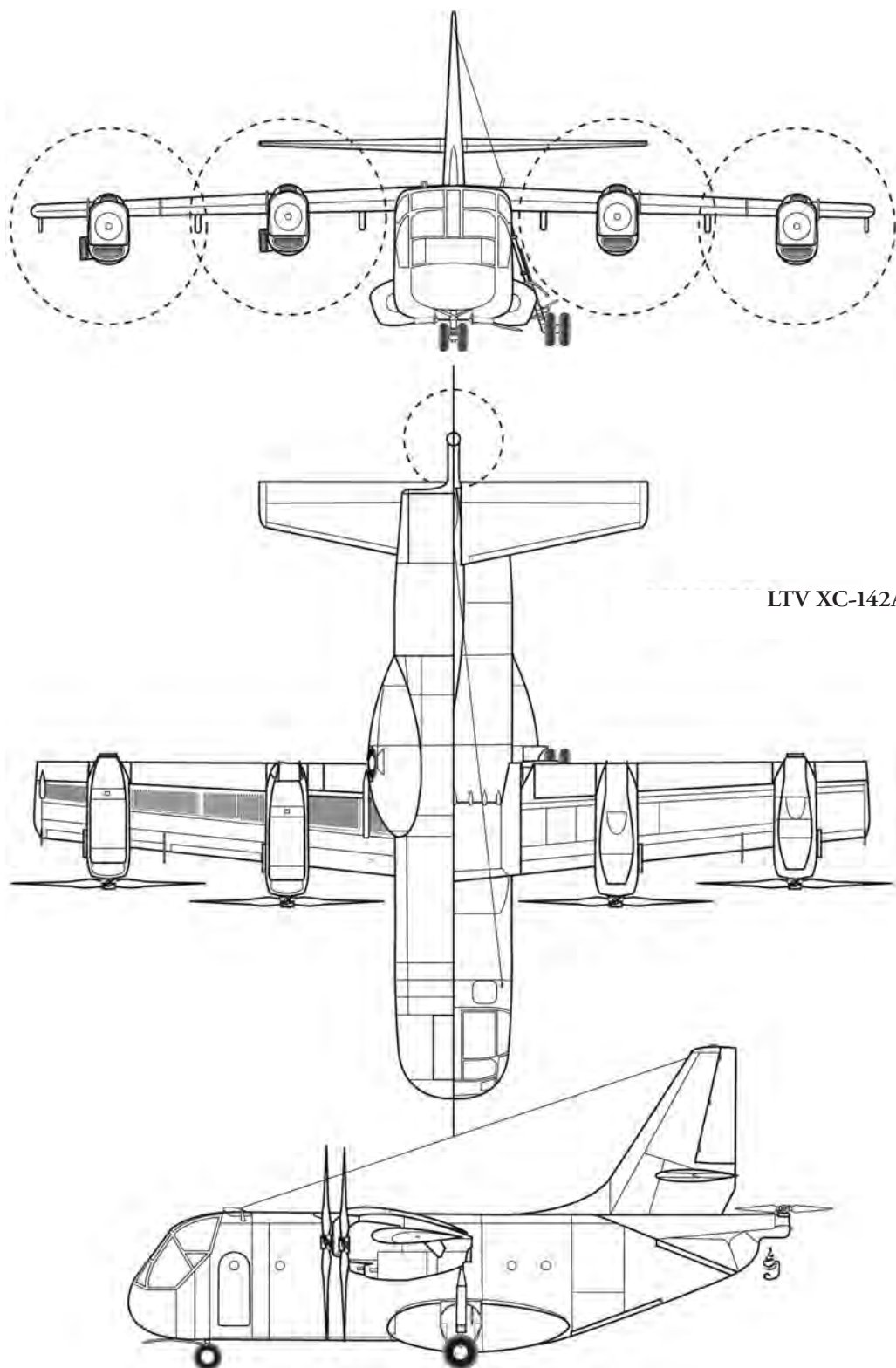
Powerplants: Four 2,850-shp General Electric T-64-1 turboprop engines driving four-bladed Hamilton Standard fully controllable fiberglass propellers, plus a three-bladed shaft-driven horizontal (lift) tail rotor.

Performance: Max. speed 431-mph, cruise 288-mph; ceiling 25,000 ft.; range 820 mi.

Weights: 22,595 lbs. empty, 42,500 lbs. (VTOL) 44,500 lbs. (STOL) max. takeoff.

Dimensions: Span 67 ft. 6 in., length 58 ft. 1 in., wing area 534.5 sq. ft.

The Ling-Temco-Vought (LTV) XC-142A stemmed from earlier USAF efforts with the tilt-wing Hiller X-18 to develop a tactical transport having vertical and short takeoff and landing (V/STOL) capabilities. In early 1961, while testing of the X-18 was still ongoing, the Department of Defense (DOD) reorganized the project into a joint services (USAF, Army, USN, and USMC) venture under the heading Tri-Service Assault Transport Program. At the time, the tilt-wing concept was envisaged as a potential means of combining the functions of a heavy helicopter and a fixed-wing assault transport into one airframe. The tri-service requirement specified a four-engine, tilt-wing aircraft that would lift a 10,000 lb. payload, cruise between 285 and 345-mph, and operate over a 250-mile combat radius. After reviewing the specifications, however, the Navy and Marines opted out of the program on the premise that excessive downwash pro-



LTV XC-142A

duced by the four-engine, tilt-wing layout would render the aircraft unsuitable for operations from flight decks and unprepared landing sites. DOD continued the design competition, and in September 1961, selected a consortium of Chance Vought Corp., Hiller Helicopters, Inc., and Ryan Aeronautical Co. (became LTV in 1963) to proceed on the detailed design of their VHR-447 V/STOL proposal, followed in early 1962 by a contract to build five prototypes under the designation XC-142A.

In order to avoid the shortcomings revealed in the testing of the X-18, the design of the XC-142A incorporated cross-shafting between engines to avoid loss of control in event of an engine failure, plus direct propeller pitch control to improve altitude and lateral handling during vertical flight and hover. The boxy fuselage featured a rear-loading ramp and contained a 30-foot by 9.5-foot cargo bay that could accommodate 8,000 lbs. of cargo or 32 fully equipped troops. As with contemporary tactical transports, the double-wheel main landing gear retracted into blisters on the sides of the fuselage. The wing could be rotated through 100-degrees, past the vertical, thereby allowing the aircraft to back up or maintain hover in a tailwind. In horizontal flight, the XC-142A employed conventional control surfaces, whereas, in the vertical flight, pitch control was maintained by a shaft-driven horizontal rotor mounted aft of the tail, roll by differential clutching of the propellers, and yaw by deflecting the ailerons in the downwash. The XC-142A prototype completed its first conventional flight on September 29, 1964, followed by hover tests on December 29, and made its first horizontal to vertical transition on January 11, 1965.



One of five Tri-Service XC-142As built seen during deck trials aboard the carrier USS *Bennington* in 1966. After determining that the program was not cost effective, the government terminated military development later that year.

Service testing of the XC-142A prototypes commenced in July 1965. The type's generous power-to-weight ratio (39:1 compared to 10:1 for a C-130E) produced excellent overall performance in various flight regimes. Trials included operations from a carrier deck, rescue exercises, paratroop drops, and low-altitude cargo extraction. But the cross-shafting between the engines proved to be a source of excessive noise and vibration, and in one instance, resulted in a fatal crash of one of the prototypes due to a complete failure of the tail rotor shaft. Testing also showed that the aircraft was difficult to control at low altitudes when the wing was tilted between 35 and 80-degrees. In early 1966, the USAF requested a proposal for a C-142B production version, which, among other things, would feature reduced empty weight and greater fuselage capacity; however, after reviewing the USAF request, the tri-service management team concluded that production of a VTOL transport was simply not cost effective.

After the military test program was terminated in May 1966, a single XC-142A prototype was turned over to NASA to be used for research and testing. In mid-1970, this aircraft was flown to the USAF Museum in Dayton, Ohio, where it remains today as a static exhibit.

## B. NAVY, MARINE CORPS, AND COAST GUARD AIRCRAFT

**GB and JB (see Beech C/UC-43 in Part A)**

**GK and J2K (see Fairchild UC-61 in Part A)**

### **Howard GH and NH (UC-70)—1941**

#### **Technical Specifications (GH-1)**

Type: Utility and training transport.

Manufacturer: Howard Aircraft Corp., Chicago, Illinois.

Total produced: 512 (485 USN/USMC/USCG; 27 AAF).

Capacity: One pilot plus four passengers.

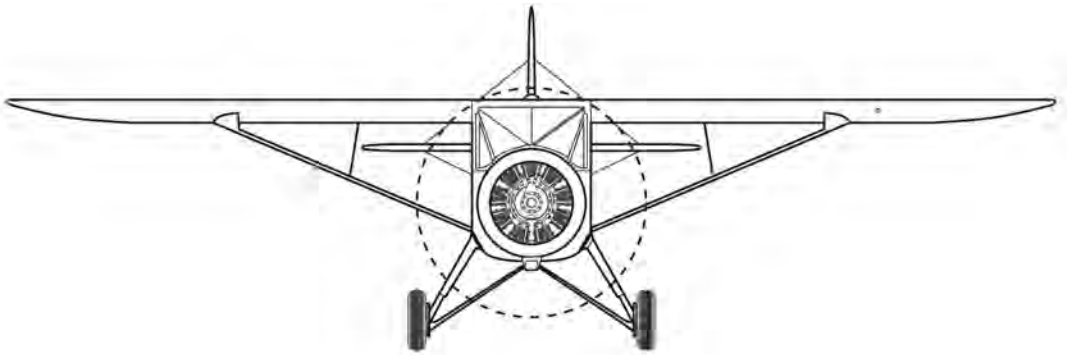
Powerplant: One 450-hp Pratt & Whitney R-985-AN1 *Wasp Junior* 9-cylinder air-cooled radial engine driving a two-bladed, variable-pitch metal propeller.

Performance: Max. speed 201-mph, cruise 170-mph; ceiling 21,000 ft.; range 1,260 mi.

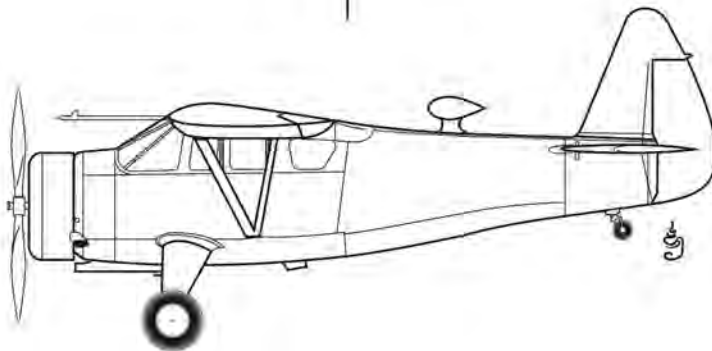
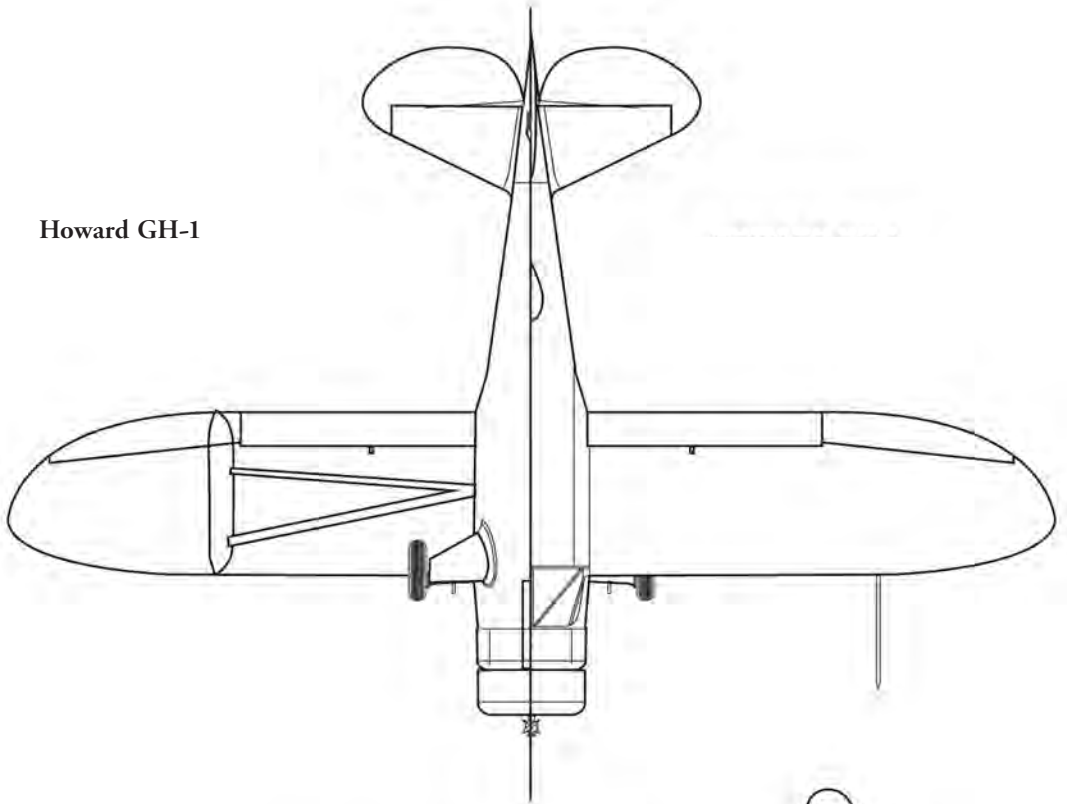
Weights: 2,700 lbs. empty, 4,350 lbs. gross.

Dimensions: Span 38 ft. 0 in., length 25 ft. 8 in., wing area 210 sq. ft.

In 1941 the Naval Bureau of Aeronautics (BuAer) initially contracted for 34 Howard civil model DGA-15Ps (DGA = damned good airplane) to be used as single-engine utility and staff transports under the designation GH-1, with all being delivered in late 1941 and early 1942. The type's general design had been inspired by Howard's Bendix and Thompson Trophy winning DGA-6 *Mr. Mulligan* racer of 1935. Additional wartime Navy orders accounted for 131 GH-2 "Nightingales" configured as air ambulances, plus 115 GH-3s, identical to the -1s except for increased fuel capacity. Howard also delivered 205 DCA-15Ps fitted with a third set of controls in the back seat as NH-1 instrument trainers. During the course of the war, a number of GH-1s, -2s, and -3s were assigned to the Marines as air ambulances and staff transports, and



Howard GH-1







One of six Howard GH-1s placed on the naval inventory by the end of 1941. In addition to 16 GH-1s, wartime orders accounted for 131 GH-2 utility transports, 115 GH-3 air ambulances, and 205 NH-1 instrument trainers.



One of 18 ex-civil Howard DGA-15Ps conscripted into AAF service during World War II as the UC-70. Presumably used as utility hacks and staff transports between bases.

three served with the Coast Guard as proficiency trainers. All GHs and NHs were sold surplus soon after cessation of hostilities in 1946.

*AAF Variants:* Starting in 1942, 23 civil Howard DGA-types were impressed into AAF service, as follows: 18 DGA-15Ps (same as GH-1) as the UC-70; two DGA-12s (300-hp Jacobs L-6 engines) as the UC-70A; one DGA-8 (320-hp Wright R-670 engine) as the UC-70C; and two DGA-9s (285-hp Jacobs L-5 engines) as the UC-70D. The AAF also purchased from Howard four off-the-shelf DGA-15Js (330-hp Jacobs L-6LMB engines) as the UC-70B. Some historical sources differ on the exact numbers of aircraft impressed. The use and eventual disposition of UC-70s in AAF service is uncertain, however, they were most likely sold surplus or returned to their owners soon after the war ended.

## Fokker (Atlantic) JA—1928

### Technical Specifications (XJA-1)

Type: Staff and cargo transport.

Manufacturer: Atlantic Aircraft Div., Fokker Aircraft Corp. of America, Hasbrouck Heights, New Jersey.

Total produced: 1 (USN).

Capacity: Crew of two plus six passengers (payload unknown).

Powerplant: One 450-hp Pratt & Whitney R-1340B *Wasp* 9-cylinder air-cooled radial engine driving a two-bladed fixed-pitch metal propeller.

Performance: Max. speed 134-mph at s.l.; ceiling 16,900 ft.; range 720 mi.

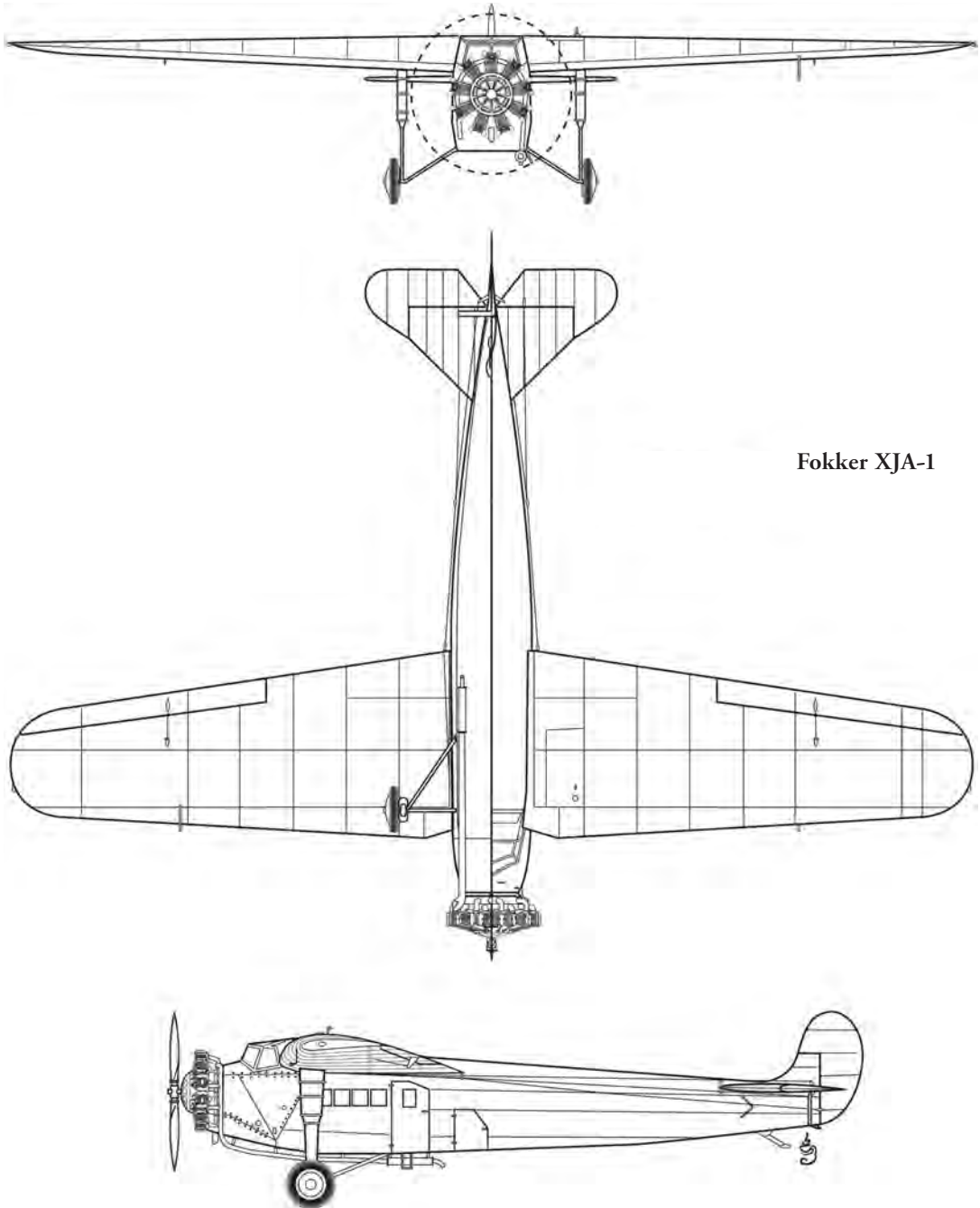
Weights: 3,250 lbs. empty, 5,500 lbs. gross.

Dimensions: Span 50 ft. 7 in., length 36 ft. 7 in., wing area 370 sq. ft.

The second type of Atlantic-assembled, Fokker transport design to be considered by the Navy, the single-engine F.VIII “Super Universal” was delivered for evaluation in 1928 as the



Fokker “Super Universal,” designated XJA-1, as seen at NAS Anacostia, Maryland, in 1928. Following brief trials, the aircraft was returned to the manufacturer.

**Fokker XJA-1**

XJA-1. Other than having a 20 percent smaller airframe, the F.VIII was basically the same in design and mixed metal and wood construction as the F.VII series (see Fokker C-2, -5, and -7 in Part A). Following brief trials, naval officials decided against procurement and returned the aircraft to the manufacturer.

**JA** (Also see **Noorduyn UC-64** in Part A)

**JRB** (see **Beech C/UC-45** in Part A)

**JRC** (see **Cessna UC-78** in Part A)

### **Grumman JF and J2F (OA-12) Duck—1933**

#### **Technical Specifications (JF-1 [J2F-5])**

Type: Utility amphibian.

Total produced: 626 (619 USN/USMC/USCG; 7 USAF)

Capacity: One pilot plus two [three] passengers or 1,000 lbs. [3,000 lbs.] of cargo.

Powerplant: One 700-hp Pratt & Whitney R-1830-62 *Twin Wasp* 14-cylinder [850-hp Wright R-1920-50 9-cylinder] air-cooled radial engine driving a three-bladed, ground-adjustable [variable-pitch] metal propeller.

Armament: One (two on J2F-2A) flexible .30-calibre machine gun in the rear cockpit [and one fixed .30-calibre machine gun in the nose] and up to 200 lbs. [650 lbs. (400 lbs. on J2F-2A)] of bombs carried on underwing racks.

Performance: Max. speed 168-mph [188-mph]; ceiling 18,000 ft. [27,000 ft.]; range 686 mi. [780 mi.].

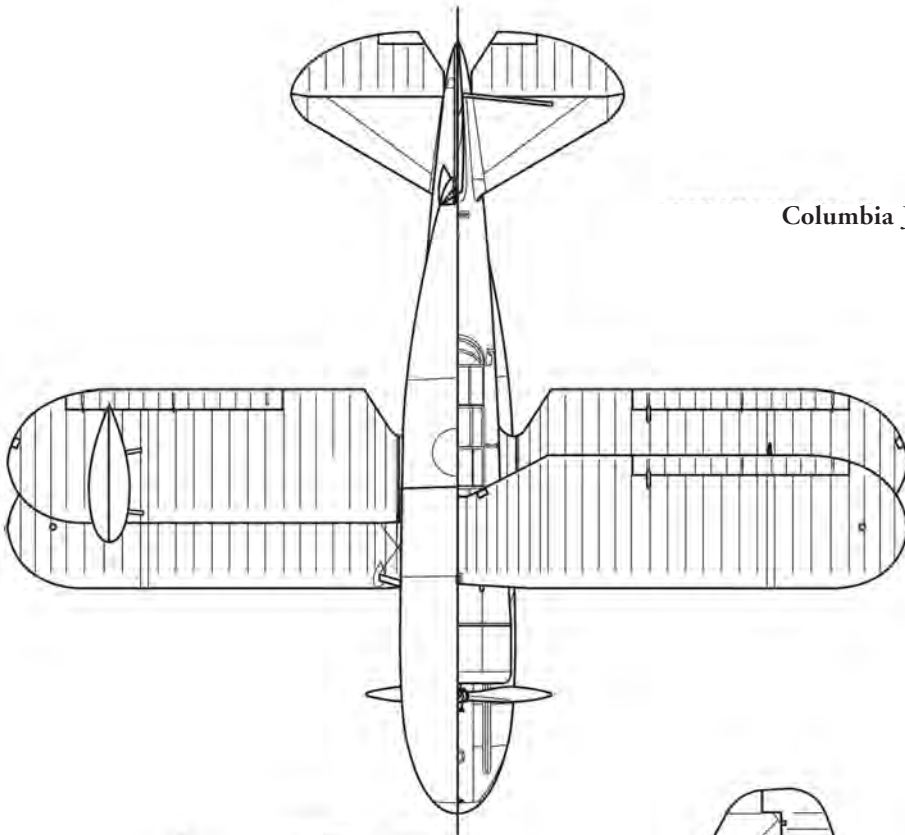
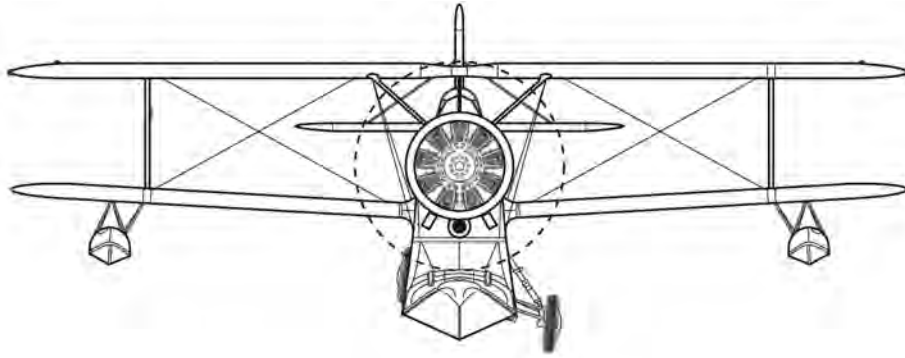
Weights: 3,700 lbs. [4,300 lbs.] empty, 5,399 lbs. [6,711 lbs.] gross.

Dimensions: Span 39 ft. 0 in., length 33 ft. 0 in. [34 ft. 0 in.], wing area 409 sq. ft.

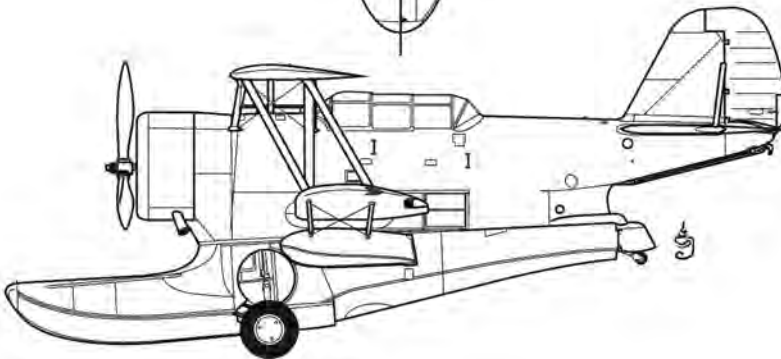
In 1931 BuAer requested Grumman to initiate a study for an amphibian designed to the Navy's new "utility" category, which specified that the aircraft also be capable of operating from



One of 14 JF-2s accepted by the Coast Guard in 1934 and 1935. The aircraft shown (VI48) was initially based at CGAS Port Angeles in Washington state.



**Columbia J2F-6**





an aircraft carrier. After reviewing Grumman's proposal for the model G-7, the company received a Navy contract in late 1932 for construction of a prototype under the designation XJF-1. The design combined the shoehorn outline of Loening's amphibians (Grumman's previous employer) with the more modern aerodynamic and structural features of the company's FF-1 two-seat fighter. Along with Grumman's already proven gear retraction system, drag was minimized by utilizing all-metal, semi-monocoque construction methods to streamline the junctions between the fuselage and the main float. The single-bay biplane wings and all moveable control surfaces were conventional metal-framed structures with fabric covering.

The first flight of the XJF-1 took place on April 25, 1933 near the Grumman factory in Farmingdale, and it was delivered to Naval Air Station Anacostia in Maryland for military trials on May 4. As originally built, the tail group of the XJF-1 was similar in size and shape to that of the FF-1, but after early testing revealed stability problems, all vertical and horizontal tail surfaces were reshaped and enlarged. Following official acceptance, the Navy placed an order for 27 production models to be delivered as the JF-1. The only noticeable difference between the production JF-1 and the prototype was the rounded fin and rudder shape that became standard throughout the series. As JF-1s began entering service in late 1934, they replaced Loening OL-9s aboard the Navy's four carriers, and as deliveries proceeded, began replacing older observation and torpedo types in utility (VJ) squadrons; and between 1936 and 1939, four of these were transferred to the Marine Corps. The 14 JF-2s ordered by the Coast Guard in early 1934 differed in having single-row 750-hp Wright R-1820-20 *Cyclone* engines that came with ring-type cowlings and a direction-finding loop antenna behind the canopy. Initial deliveries of JF-2s commenced later the same year, and on December 4, 1934, a USGC JF-2 established a new amphibian world speed record of 191-mph. One of the last JF-2s produced was reassigned to the Marines and entered service with VJ-6M at Quantico, Virginia in late 1935. The last of the JF series,



J2F-6, final Duck variant, was built by Columbia because of Grumman's other wartime production commitments. Five J2F-5s and two J2F-6s transferred to USAF Air Rescue Service in 1948 as OA-12A/B.

five *Cyclone*-powered JF-3s completed in late 1935, came without carrier arresting gear and were delivered directly to naval reserve units.

Grumman began design work on the improved model G-15 in 1935, and in March 1936, BuAer ordered 20 production aircraft as the J2F-1. Powered by the same R-1820-20 engine as the JF-2, changes included a lengthening of the main float with accommodation for an additional crewmember or a medical stretcher in the compartment below the cockpit, removal of the inter-aileron struts, and a strengthening of the airframe to allow catapult launches from ships. The first J2F-1 was flown on April 3, 1937, and all had been delivered to Navy and Marine units by the end of the year. To keep pace with the general expansion of the fleet, BuAer ordered four more batches of J2Fs from Grumman in 1937 and 1938, which all entered service during 1939: 21 J2F-2s equipped with 790-hp R-1820-30 engines and one fixed .30-calibre machine gun firing between cylinders; nine J2F-2As for the Marines that featured two additional bomb racks and twin machine gun mounts in the rear cockpit; 20 J2F-3s specially outfitted to serve as VIP transports; and 32 J2F-4s that differed from -2s only in minor details.

With war clouds on horizon, BuAer placed an order with Grumman in early 1940 for 144 J2F-5s, and deliveries started before the end of the year. J2F-5s were powered by 850-hp R-1820-50 engines, upping top speed by 10-mph, and could be distinguished by their full-chord cowlings. At some point during J2F-5 production the airplane acquired the name "Duck." Five J2F-5s were transferred to the Coast Guard and 20 to the Marines starting in early 1942. Because Grumman's assembly lines were urgently needed to manufacture fighters and torpedo-bombers after the U.S. entered World War II, license-production of the J2F was shifted to the Columbia Aircraft Corp. at Valley Stream, New York, and from mid-1942 to late 1945, a further 330 Ducks were completed there as the J2F-6 (initially designated JL-1). J2F-6s were identical to -5s except for a 1,050-hp R-1820-54 engines and constant-speed propellers. Besides Navy production, five J2F-6s were delivered to the Coast Guard and an unspecified number to the Marines. In wartime service, J2Fs were used for a variety of functions, flying reconnaissance, air-sea rescue, and armed patrol missions in addition to their normal ship-to-shore transportation duties. The Navy and Coast Guard began phasing-out J2Fs from service soon after the war ended, with the very last examples being retired in 1948.

*USAF Variants:* Five ex-Navy J2F-5s and two J2F-6s were transferred to the U.S. Air Force in 1948 as the OA-12A and -12B, respectively, where they operated out of Elmendorf AFB with the 10th Air Rescue Squadron until the early 1950s. Today, one flying example, a Columbia-built J2F-6, civil registration number N1196N, is maintained by the Experimental Aircraft Association in Oshkosh, Wisconsin.

## Grumman JRF (OA-9 and OA-13) Goose—1937

### Technical Specifications (JRF-5)

Type: Utility amphibian.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total produced: 261 (222 USN/USMC/USCG; 39 AAC/AAF).

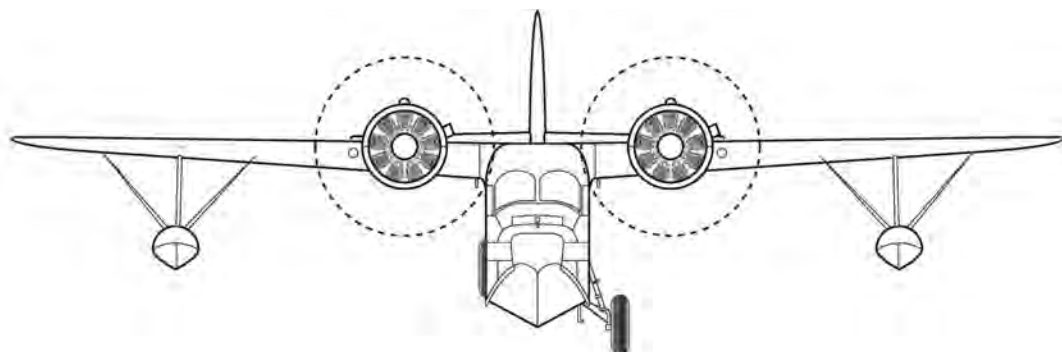
Capacity: Crew of two plus six passengers or 2,575 lbs. of cargo.

Powerplants: Two 450-hp Pratt & Whitney R-985-AN-12 *Wasp Junior* 9-cylinder air-cooled radial engines driving two-bladed, variable-pitch metal propellers.

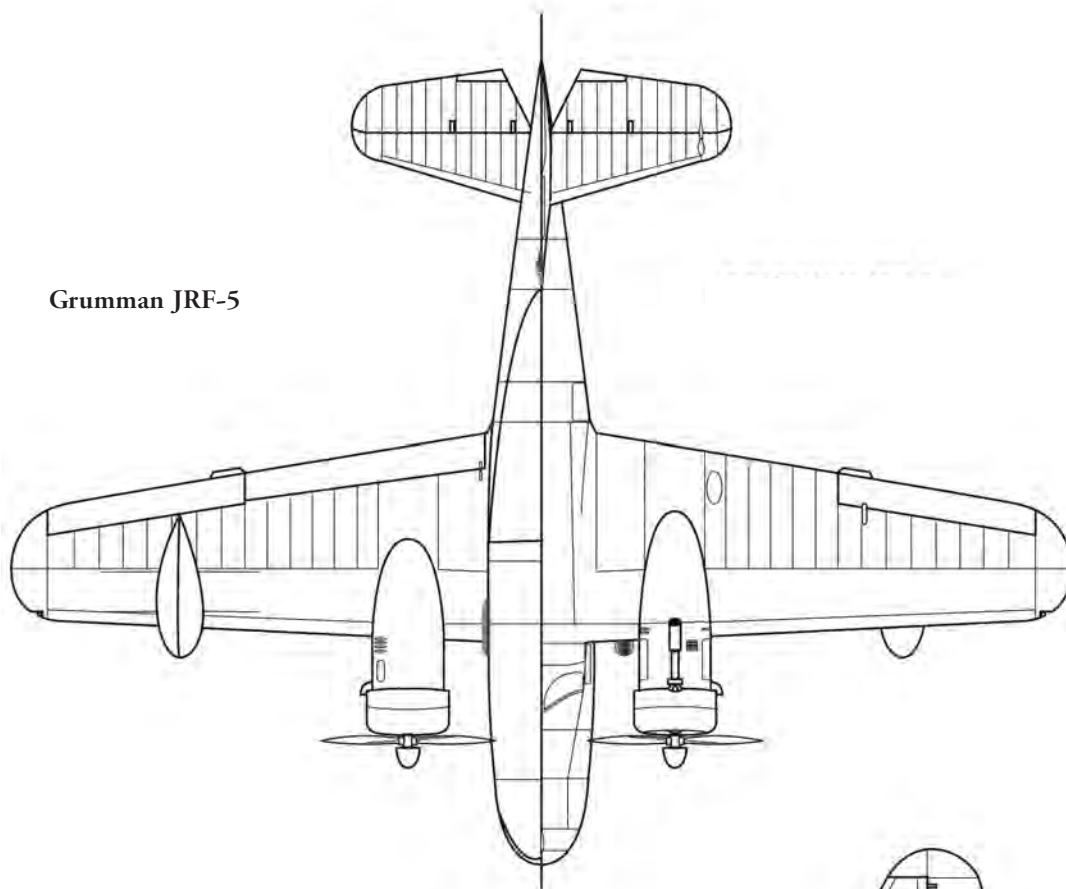
Performance: Max. speed 201-mph, cruise 150-mph; ceiling 21,300 ft.; range 800 mi.

Weights: 5,245 lbs. empty, 8,000 lbs. gross.

Dimensions: Span 49 ft., length 38 ft. 6 in., wing area 375 sq. ft.



Grumman JRF-5



Certainly one of the longest-lived seaplanes of all time, the Goose is also recognized as having been the very first monoplane to be designed by Grumman. The original impetus leading up to its design reportedly came from a group of wealthy New York businessmen, who in 1936, approached Leroy Grumman with the proposition of developing a modern twin-engine amphibian to be used as a fast executive transport. Once Grumman agreed to build the aircraft, he assigned the project to design engineer William Schwendler and hydrodynamicist Ralston Stalb as the company model G-21. Working quickly, the team conceived a deep-bodied, two-step hull of exceptionally clean design, which joined to a cantilevered wing incorporating split-type flaps to keep takeoff and landing speeds within acceptable limits. Power was derived from two tightly cowled 450-hp *Wasp Junior* engines mounted in nacelles on the wings. Other than fabric-covered control surfaces, the entire airframe consisted of light-alloy aluminum construction. The only concessions to drag were fixed stabilizing floats and a strut-braced horizontal stabilizer. After making its first flight on May 29, 1937, the G-21 demonstrated superb handling qualities combined with performance that exceeded most twin-engine landplane designs.

Grumman initially sold 14 G-21s to civilian customers in 1937 for an average price of \$68,000. Refinements to the hull, upgraded SB2 engines, and a 500 lb. increase in takeoff weight resulted in the introduction of the G-21A as the standard civil production model. As interest in the new amphibian became more widespread, Grumman began receiving additional orders from airline, military, and overseas customers. The first actual military sale transpired in June 1938 when a G-21A was sold to the Royal Canadian Air Force. Later in 1938, the Navy obtained a G-21A for evaluation as a shore-based utility amphibian under the designation XJ3F-1, and in early 1939, following brief trials, gave Grumman an order for ten more as the JRF-1. Shortly after entering Navy service, one JRF-1 was transferred to the Marine Corps as a command aircraft and five others, including the original XJ3F-1, after receiving modifications for target-towing



One of seven JRF-2s delivered to the Coast Guard in 1940 and 1941. Although assigned to fly anti-submarine patrols during the early months of the war, Coast Guard JRFs were primarily dedicated to search and rescue.

and photographic work, were returned to service as the JRF-1A. Military orders continued through the year: ten new aircraft accepted by the Coast Guard in 1940, seven as JRF-2s with seats interchangeable with stretchers and three as JRF-3s with autopilots and de-icing equipment; and ten by the Navy in 1940 and 1941 as JRF-4s having wing racks that carried either two 250 lb. bombs or depth charges.

As the U.S. stepped-up its preparations for war, Grumman received a large-scale contract in 1940 to produce 185 examples as the JRF-5, with deliveries scheduled to begin in 1941. As the principal wartime production variant, the JRF-5 featured small detail refinements, uprated AN-12 engines, as well as camera equipment. Six more specially outfitted for rescue work entered service with the Coast Guard as the JRF-5G. During the early days of World War II, Navy and Coast Guard JRFs armed with depth charges saw extensive use in antisubmarine patrols off the U.S. coast, but as the submarine threat diminished, Navy JRFs reverted to their utility transport role, while Coast Guard types were employed mainly for search and rescue operations. Navy JRFs virtually disappeared from service as soon as World War II ended, while small numbers of Coast Guard JRF-5Gs remained active until the mid-1950s.

*AAF Variants:* The AAC awarded Grumman a contract in 1938 to deliver 26 G-21s under the designation OA-9. In 1942, after the war began, an estimated seven or eight civilian examples were impressed into AAF service, G-21s as the OA-9 and G-21As as the OA-13. Of the 47 JRF-6Bs completed with improved electrical systems and specialized equipment for navigational training, five entered AAF service as the OA-9GR and the rest were Lend-Leased to Britain. AAC/AAF-9s and -13s typically served as utility and staff transports at coastal bases but were also used to augment search and rescue efforts. All were sold surplus soon after cessation of hostilities in 1945.

In civilian hands after war, ex-military G-21s and G-21As enjoyed a long and successful career hauling freight and passengers for commercial carriers located in island and coastal regions all over the world. Today, approximately 50 G-21 variants are thought to be in existence, though the actual number in flyable condition is not reported.

## Grumman J4F (OA-14) Widgeon—1940

### Technical Specifications (J4F-1)

Type: Utility amphibian.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total produced: 167 (141 USN/USCG; 26 AAF).

Capacity: One pilot plus four passengers or 1,285 lbs. of cargo.

Powerplants: Two 200-hp Ranger L-440-5 6-cylinder air-cooled inline engines driving two-bladed, fixed-pitch wooden propellers.

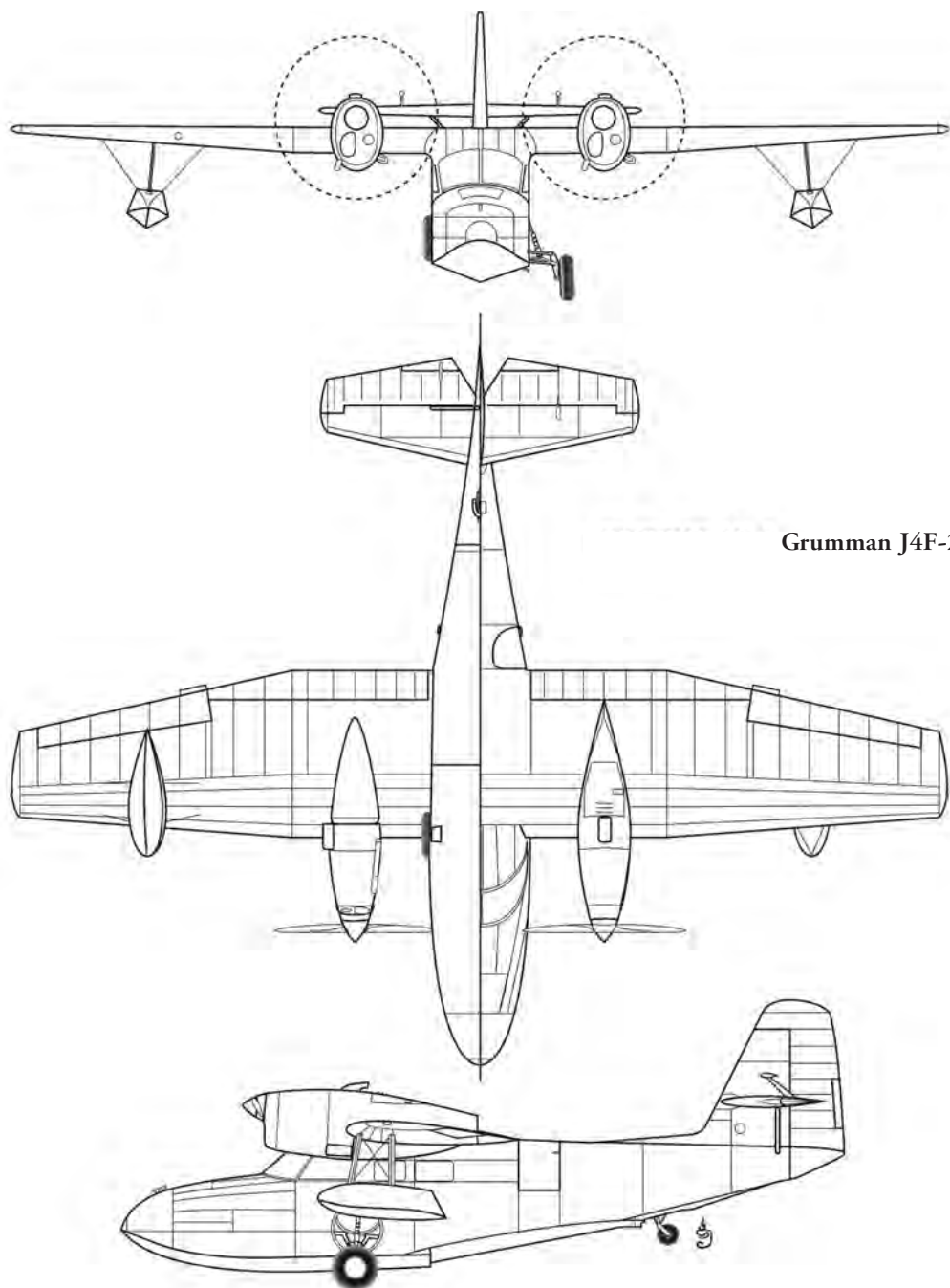
Performance: Max. speed 153-mph, cruise 138-mph; ceiling 17,500 ft.; range 780 mi.

Weights: 3,240 lbs. empty, 4,525 lbs. gross.

Dimensions: Span 40 ft. 0 in., length 31 ft. 1 in., wing area 245 sq. ft.

Originally conceived in 1940 for the civilian market, Grumman's Ranger-powered model G-44 found itself conscripted into military service by the time it reached production. While utilizing the proven two-step hull configuration, hand-operated landing gear, and all-metal construction of the model G-21, the smaller G-44 materialized with the squared-off wings and tail surfaces that typified newer Grumman designs (e.g., F4F-3, TBF-1). An all-new wing planform, presenting a constant-chord center-section on which the inline engines were mounted high up out of the spray, featured a sharply tapered trailing edge from mid-chord to the tip and fully articulated trailing-edge flaps. The first flight of the G-44 prototype took place on June 28,





Grumman J4F-2

1940 from Grumman's plant at Bethpage, and as flight trials proceeded, the only aerodynamic change consisted of adding mass balance horns to the elevators.

The first 25 production G-44s, assigned the BuAer designation J4F-1, were allocated to the Coast Guard, with deliveries commencing in mid-1941. From 1942 to 1945, Grumman completed another 131 G-44s under Navy contracts as the J4F-2, fifteen of which were exported under Lend-Lease. Coast Guard J4F-1s, after being retrofitted to carry a 200 lb. depth charge beneath



Once the government commandeered all G-44 production, the first 25 completed went to the Coast Guard in 1941 as the J4F-1. They flew armed patrols along the U.S. coast in early World War II.

the right wing between the fuselage and the engine nacelle, began flying antisubmarine missions off the American coast. In Navy service most J4Fs were employed as land-based utility and staff transports, though some were used as instrument trainers, while Coast Guard variants saw most of their service in the search and rescue role. All Navy and Coast Guard J4F variants were phased-out and sold surplus between 1946 and 1948.

*AAF Variants:* In early 1942, 10 G-44s destined for Portugal and 16 ordered by civilian purchasers were impressed into AAF service as the OA-14. No details are available as to the operational use and ultimate disposition of the OA-14s, though the AAF most likely sold them surplus soon after war ended. Grumman resumed civil production of Widgeons in 1945 and many, after undergoing numerous upgrades and rebuilds, are still flying today.

## Fairchild JK—1936

### Technical Specifications (JK-1)

Type: Utility transport.

Manufacturer: Fairchild Engine & Airplane Corp., Hagerstown, Maryland.

Total military versions: 1 (USN).

Capacity: One pilot plus four passengers.

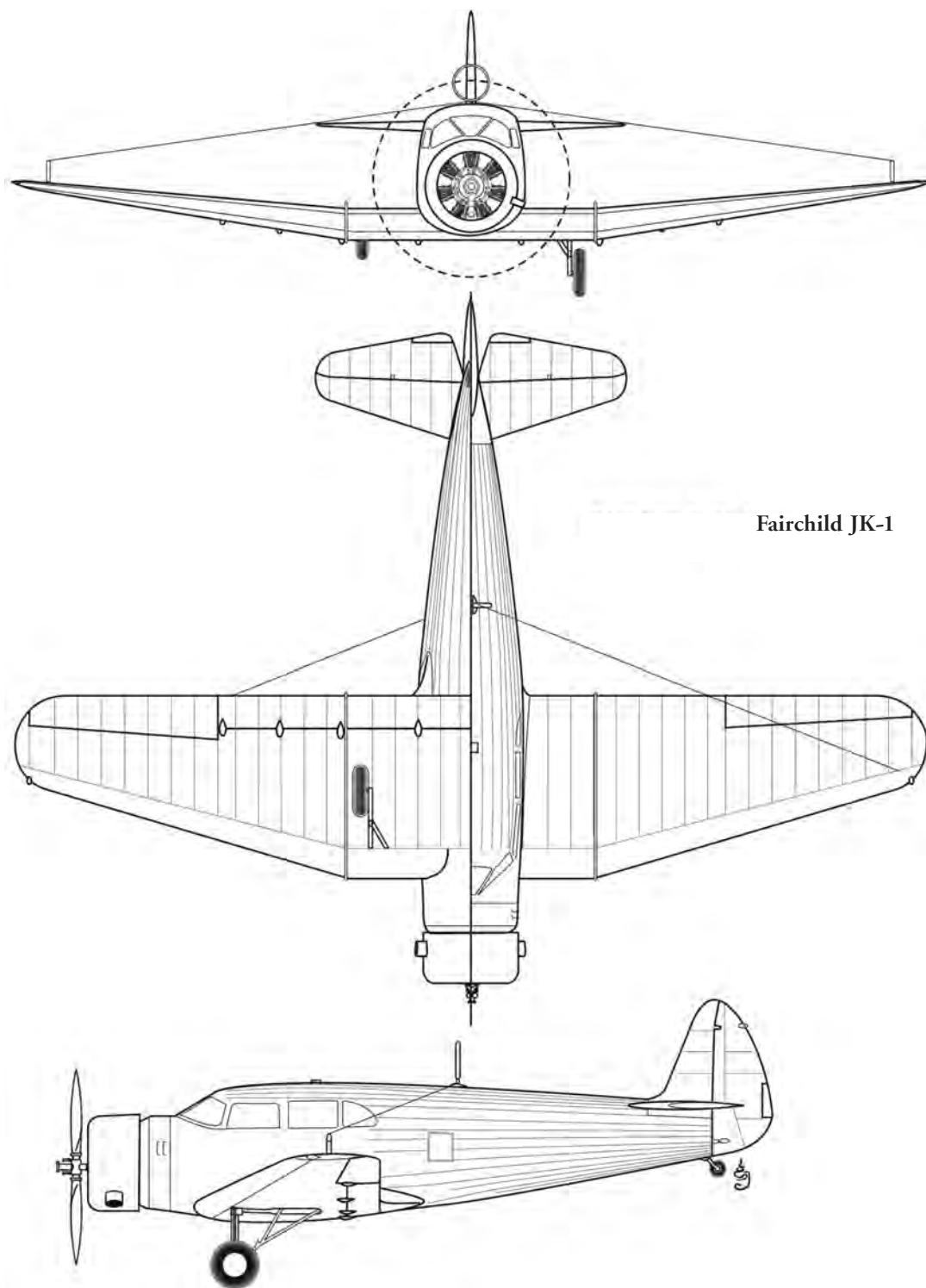
Powerplant: One 320-hp Wright R-760-6 7-cylinder air-cooled radial engine driving a two-bladed, variable-pitch metal propeller.

Performance: Max. speed 170-mph; ceiling 18,700 ft.; range 650 mi.

Weights: 2,512 lbs. empty, 4,000 lbs. gross.

Dimensions: Span 39 ft. 6 in., length 30 ft. 1 in., wing area 248 sq. ft.

The Navy purchased one Fairchild Model 45-A in 1936 which was taken into service as a utility transport under the designation JK-1. Featuring mixed, fabric-covered construction with a fully cantilevered wing and tail group, plus retractable landing gear, the Model 45 had



Fairchild JK-1



**Sole Fairchild Model 45-A purchased as the JK-1 in 1936, as seen in 1939 at NRAB Oakland, California, after being assigned as a staff transport to serve the new air station under construction in Alameda.**

been designed in 1934 as an executive transport that would be marketed against single-engine aircraft like the cabin Waco and Stinson Reliant, however, only a handful sold on the civil market. Following official acceptance, the Navy's JK-1 was given a blue-trimmed command paint scheme and assigned to the Admiral's staff at NAS Anacostia. By the time the U.S. entered World War II in December 1941, the aircraft had been transferred to general duties at NAS San Diego.

## Columbia JL —1946

### Technical Specifications (XJL-1)

Type: Utility amphibian.

Manufacturer: Columbia Aircraft Corp., Valley Stream, New York.

Total military versions: 3 (USN).

Capacity: Crew of one plus seven passengers (payload unknown).

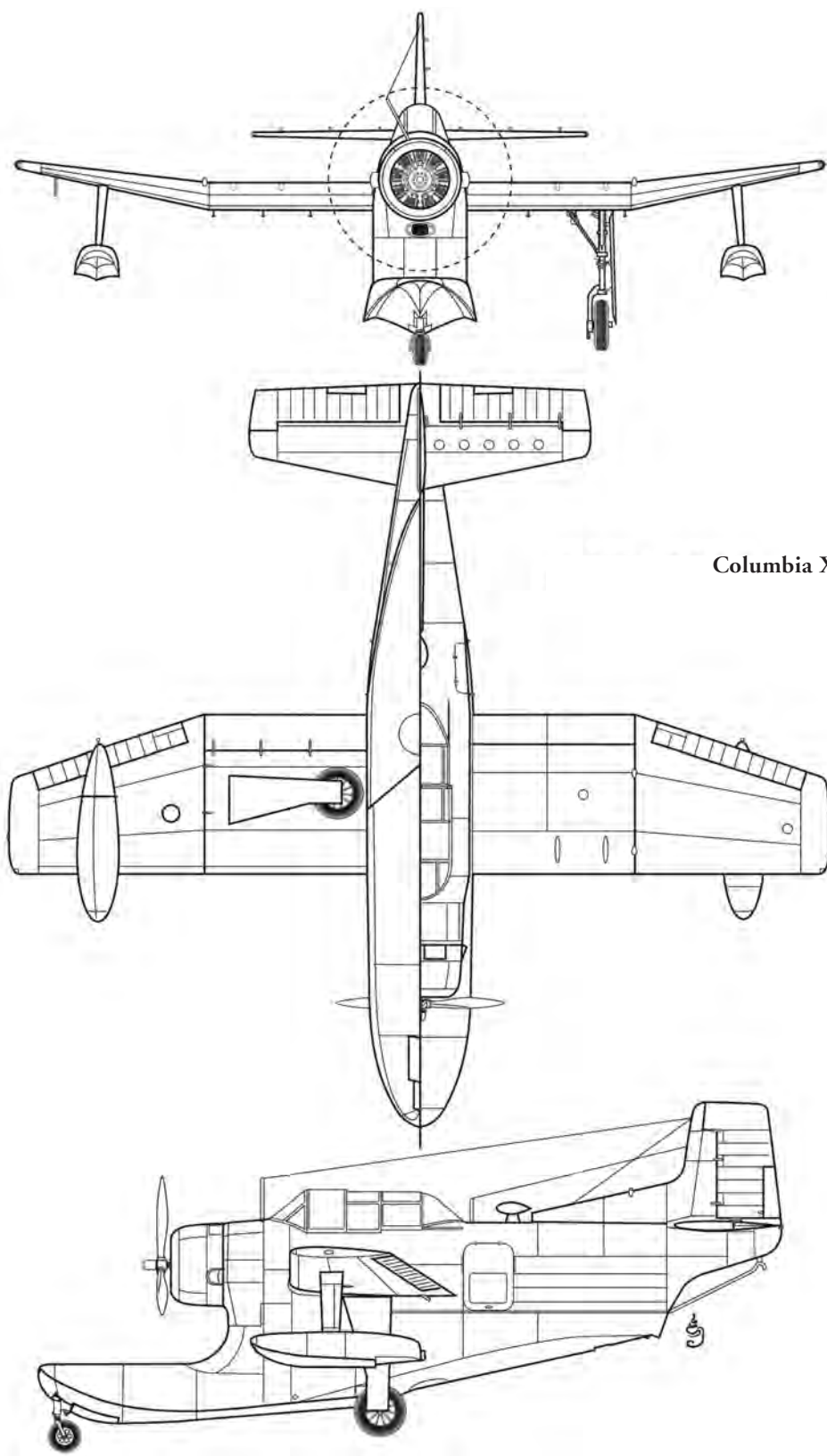
Powerplant: One 1,200-hp Wright R-1820-56 *Cyclone* 9-cylinder air-cooled radial engine driving a three-bladed, constant-speed metal propeller.

Performance: Max. speed 174-mph, cruise 119-mph; ceiling (not reported); range 2,070 mi.

Weights: Empty (not reported), 13,000 lbs. gross (est.).

Dimensions: Span 50 ft. 0 in., length 45 ft. 11 in., wing area (not reported).

Grumman began laying down the design of the Model G-42 in mid-1939, a monoplane intended as a successor to the J2F Duck series, however, as a consequence of wartime priorities to mass produce other aircraft (e.g., F4F, TBF, F6F), the project remained on hold until being transferred to Columbia Aircraft sometime in 1943. The design of the G-42 was characterized by the shoehorn fuselage/pontoon configuration of the J2F and squared-off, tapered wings similar



Columbia XJL-1





**One of two Columbia XJL-1 prototypes as delivered to NATC for testing in 1947. The design had been initiated by Grumman in 1939 as the G-42, as a successor to the Duck, but was licensed to Columbia in 1943.**

in shape to those of the G-44 Widgeon. The design also incorporated a tricycle type landing gear in which the main wheels retracted into the wing rather than the main float. BuAer awarded Columbia a contract to build two flying prototypes and one static test example under the designation XJL-1, but the war ended before construction of the aircraft was completed. The maiden flight of the first XL-1 prototype took place on October 15, 1946, and both prototypes were delivered to NATC in 1947 for evaluation. After testing in 1947 and 1948 revealed structural problems the airframe, the Navy decided to abandon further development. Both aircraft were afterward placed in storage at NAS Norfolk, Virginia and remained there until being sold surplus in 1959.

One of the XJL-1s, civil registry, N48RW, was restored flying condition during the late 1980s but crashed at Camp Pendleton, California in 1997. It is now reportedly undergoing restoration. The other XL-1, civil registry N54205, is currently preserved at the Pima Air Museum in Tucson, Arizona.

**JO (see Lockheed C/UC-40 in Part A)**

**JR (see Ford C-3 and C-9 in Part A)**

**Sikorsky JRS (OA-8 and -11)—1935**

## Sikorsky JRS —1937

### Technical Specifications (JRS-1)

Type: Utility-transport amphibian.

Manufacturer: Sikorsky Aviation Div. of United Aircraft Corp., Bridgeport, Connecticut.

Total military versions: 23 (17 USN/USMC; 6 AAC/AAF).

Capacity: Crew of two plus 19 passengers or 6,750 lbs. of cargo.

Powerplants: Two 750-hp Pratt & Whitney R-1690-52 *Hornet* 9-cylinder air-cooled radial engines driving three-bladed, variable-pitch metal propellers.

Performance: Max. speed 194-mph, cruise 167-mph; ceiling 20,700 ft.; range 775 mi.

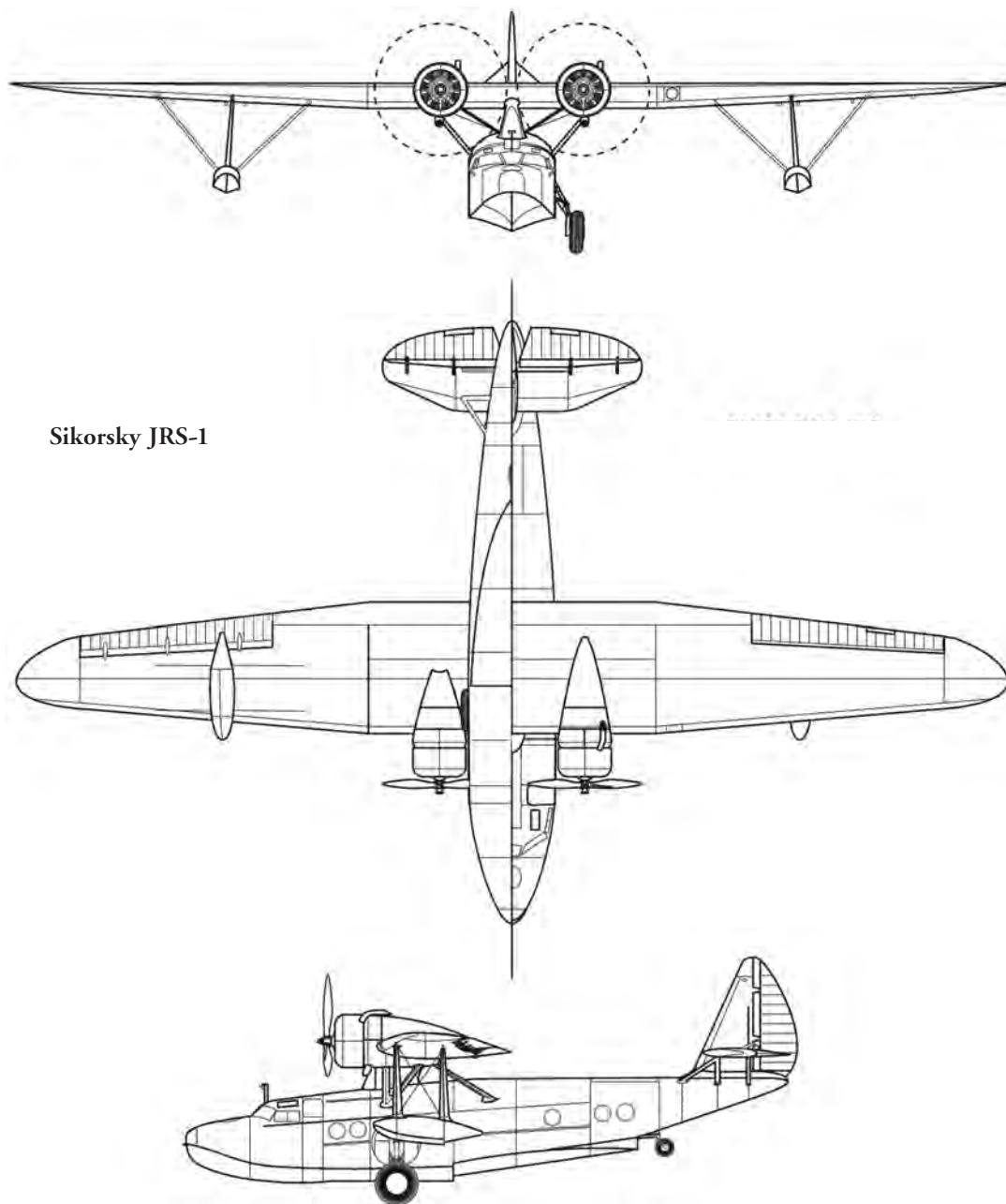
Weights: 12,750 lbs. empty, 19,096 lbs. gross.

Dimensions: Span 86 ft, length 51 ft. 2 in., wing area 781 sq. ft.

The Sikorsky Model S-43 was originally conceived to fulfill a Pan American Airways requirement for a twin-engine amphibian that would operate on secondary Latin American routes. Flying for the first time in mid-1935, the S-43 appeared as a modern all-metal design featuring a single-step hull and a wing supported by a center pylon and N-struts. Wing flaps occupying forty-eight percent of the span reduced stall speed to 65-mph, permitting takeoffs and landings in relatively tight waterways. In 1937, when Sikorsky had sold over 20 of these transports to commercial users, BuAer ordered the first of 17 S-43s accepted into service over the next two years as the JRS-1. Eight JRS-1s were ultimately assigned to VJ-1 in San Diego and the remainder to various stations, including one each to Marine squadron VMJ-1 (became VMJ-153 in 1941) in San Diego and VMJ-2 (became VMJ-252) in Quantico. At the time the U.S. entered World War II, five JRS-1s remained, four in Navy units and one with the Marines, with the Marine example being the only one to survive the war. Two compete S-43s are known to exist today, one JRS-1 preserved in Marine markings at the Pima Air Museum in Tucson, Arizona, and the



Navy JRS-1, probably in 1937, shown before application of unit markings. The 15 Navy and two Marine Corps JRS-1s reportedly remained in service up through the end of World War II.



Sikorsky JRS-1

S-43 once owned by billionaire Howard Hughes, which is reportedly still maintained in flying condition.

*AAC/AAF Variants:* During 1937 the AAC acquired five S-43As that were placed in service as the YIOA-8 (later OA-8), then in 1942, a commercial S-43H (875-hp R-1690-S2C engines) was impressed AAF service as the OA-11.

## J2W (see Waco UC-72 in Part A)

### Martin PBM Mariner—1942

#### Technical Specifications (PBM-3R)

Type: Long-range logistical flying boat transport.

Manufacturer: Glenn L. Martin Co., Baltimore, Maryland.

Total military variants (transports): 49 (USN).

Capacity: Crew of four plus 23 passengers or 8,000 lbs. of cargo.

Powerplants: Two 1,700-hp Wright R-2600-12 *Twin Cyclone* 14-cylinder air-cooled radial engines driving three-bladed Curtiss Electric controllable-pitch metal propellers.

Performance: Max. speed 210-mph, cruise 140-mph; ceiling 20,200 ft.; range 2,800 mi.

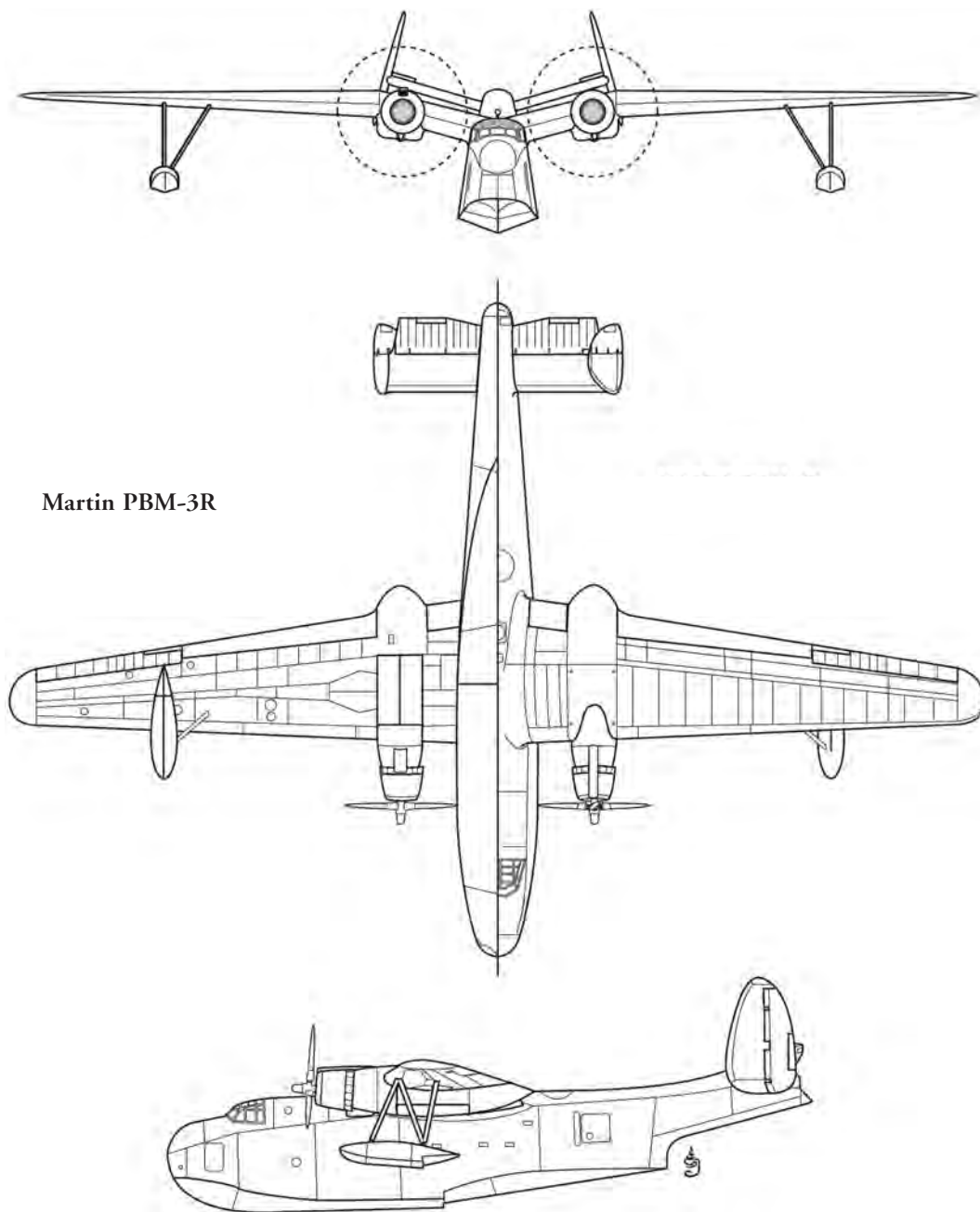
Weights: 29,900 lbs. empty, 54,500 lbs. max takeoff.

Dimensions: Span 118 ft. 0 in., length 79 ft. 10 in., wing area 1,400 sq. ft.

Though very well-known as a maritime patrol bomber, the first 31 PBM-3s Martin actually delivered to the Navy in the spring of 1942 were immediately stripped of all armament and armor, equipped with reinforced floors and cargo handling equipment, and then placed in oper-



Nearly new PBM-3R shown in 1942 soon after being converted into a transport configuration. Most of the 49 -3Rs operated out of Hawaii flying high-value personnel and cargos to various Pacific Theater commands.



**Martin PBM-3R**

ation with the Naval Air Transportation Service (NATS) as PBM-3R over-ocean transports, and a further 18 were completed as -3Rs at the factory. A majority of the NATS PBM-3Rs entered service initially with VR-2 out of NAS Kaneohe in Oahu, Hawaii, flying high-value personnel and cargoes to various combat commands in the Pacific Theater. Later, as Douglas R5Ds began replacing them on long-range routes, NATS assigned many of PBM-3Rs to operate with the Pan American Airways Pacific Division from bases in San Francisco Bay and Pearl Harbor. All PBM-3Rs were withdrawn from service soon after World War II ended.



## Martin PB2M and JRM Mars —1942

### Technical Specifications (JRM-3)

Type: Long-range logistical flying boat transport.

Manufacturer: Glenn L. Martin Co., Baltimore, Maryland.

Total military versions: 7 (USN).

Capacity: Crew of four plus 133 troops, 84 medical litters, or 32,000 lbs. of cargo.

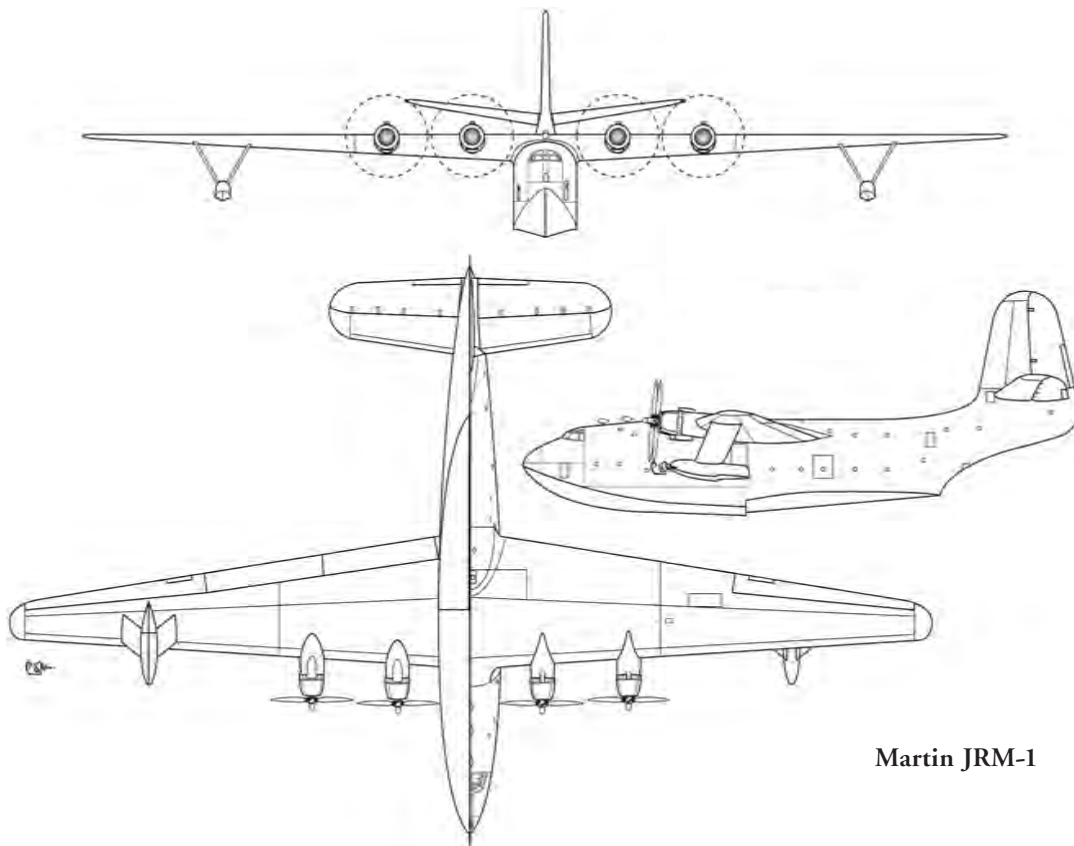
Powerplants: Four 3,000-hp Pratt & Whitney R-4360-4 *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Hamilton Standard constant-speed (fully reversible on inboard engines) metal propellers.

Performance: Max. speed 238-mph, cruise 215-mph; ceiling 14,600 ft.; range 6,750 mi.

Weights: 75,573 lbs. empty, 148,500 lbs. normal gross, 165,000 lbs. max. takeoff.

Dimensions: Span 200 ft. 0 in., length 120 ft. 3 in., wing area 3,683 sq. ft.

Martin's XPB2M-1 Mars was ordered by BuAer in early 1938 as the last of three "Sky Dreadnought" flying boats to be evaluated as long-range patrol bombers (see also Sikorsky PBS and Consolidated PB2Y, below). Although it had been scheduled to fly in late 1941, damages sustained during taxi tests delayed the XPB2M-1's first flight until July 2, 1942, by which time the Navy had discarded the Sky Dreadnought concept in favor of acquiring huge numbers of twin-engine flying boats (i.e., PBVs and PBM)s to accomplish the maritime patrol function. In early 1943 BuAer directed Martin to remove all armament and associated bombing equipment from the prototype and modify it as a transport under the new designation XPB2M-1R. After the modified prototype completed service trials in late 1943, it was turned over to VR-2, a regular Naval Air



Martin JRM-1



Dubbed “the Old Lady” by aircrews, the sole XPB2M-1R served with VR-2 during World War II and was used afterward to transition aircrews into the newer JRM-1s.

Transportation Service (NATS) unit operating out of NAS Alameda, California, and began making regular cargo runs between the West Coast and Hawaii.

Naval war planners reached the conclusion in early 1944 that limited numbers of large flying boat transports would be needed to augment NATS operations in the Pacific for the anticipated invasion of Japan; thus, in June 1944, BuAer awarded Martin a contract to produce 20 twenty improved Mars transport variants under the new designation JRM-1. Though retaining the original wing planform and R-3350 engines of the XPB2M-1R, the JRM-1 was essentially a new airframe. The hull was lengthened six feet forward of the wings while the aft fuselage was shortened three feet and reshaped to support a large single fin and rudder. Internally, cargo handling was optimized by installing an overhead hoist and deleting many of the bulkheads between compartments. The first JRM-1, christened *Hawaii Mars*, was delivered to the Navy for evaluations in late July 1945, but was accidentally destroyed two weeks later in a landing accident on Chesapeake Bay. Martin delivered four more JRM-1s by the end of the year; however, as a result of the V-J Day cutbacks, the original order was reduced to only six aircraft. After entering Navy service, all four JRM-1s received names in Bureau Number order, i.e., *Philippine Mars*, *Marianas Mars*, *Caroline Mars*, and *Hawaii Mars* (No. 2). The sixth and final Mars, delivered in 1946 as the JRM-2 and subsequently named *Marshall Mars*, was completed with the 3,000-hp R-4360-4 engines and distinguishable by longer-chord cowlings. It also featured fully reversible propellers on the two inner engines, which improved water handling to the extent that the aircraft could now back up. The increase in power upped takeoff weight by 16,000 lbs. and added over 10,000 lbs. to useful load. Over time, in order to bring them up the JRM-2 payload standard, all four JRM-1s were refitted with R-4360 engines and returned to service as JRM-3s.

After 1945, the XPB2M-1R was used to train the aircrews transitioning to the new JRMs, after which it was assigned to NATC Patuxent, Maryland, for maintenance training until being scrapped in 1949. As they became fully operational, the five JRMs were assigned to VR-2, oper-



The last of six Mars built, the JRM-2 came with more powerful R-4360 engines. Christened *Marshall Mars*, this aircraft was destroyed off Diamond Head, Hawaii, in May 1950.



*Philippine Mars*, a JRM-1, is seen making a jet-assisted takeoff (JATO) in the late 1940s. Amazingly, this aircraft is one of two surviving Mars that still operate as fire-bombers out of British Columbia, Canada.

ating from NAS Alameda in San Francisco Bay. Though used primarily to haul cargo and personnel between the West Coast and Hawaii, the big flying boats did occasionally depart from routine duties to perform some impressive feats: in 1949, the *Caroline Mars* carried a payload of 68,282 lbs. (double the normal load) from Baltimore to Cleveland (Lake Erie); in 1950, the *Caroline Mars*, again, transported 144 Marines from San Diego to Honolulu; and in 1949, the *Marshall Mars* carried a record 301 servicemen plus a crew of seven from San Diego to Alameda. In May 1950, while operating off Diamond Head in Hawaii, the *Marshall Mars* was forced to make an open sea landing after one of its engines caught fire. All of the crew escaped to safety, but the aircraft was entirely consumed by the fire. Other than this incident, the JRMs enjoyed a virtually unblemished safety record during their tenure with VR-2.

In 1956 the Navy began the process of reequipping VR-2 with Convair R3Ys (see below), and the final Mars flight took place in August of that year. Thereafter, the four Mars were hauled out of the water on beaching gear and consigned to the boneyard at Alameda; three years later, all four aircraft were sold to a scrap dealer for a combined price of \$23,650. Two survivors, *Philippine Mars* and *Hawaii Mars*, serve today as fire-bombers in British Columbia under Canadian registration.

## Sikorsky PBS and JR2S—1942

### Technical Specifications (JR2S-1)

Type: Long-range logistical flying boat transport.

Manufacturer: Vought-Sikorsky Div. of United Aircraft Corp., Bridgeport, Connecticut.

Total military versions: 4 USN.

Capacity: Crew of six plus 47 passengers (payload unknown).

Powerplants: Four 1,200-hp Pratt & Whitney R-1830-S1C Twin Wasp 14-cylinder air-cooled radial engines driving three-bladed, constant-speed metal propellers.

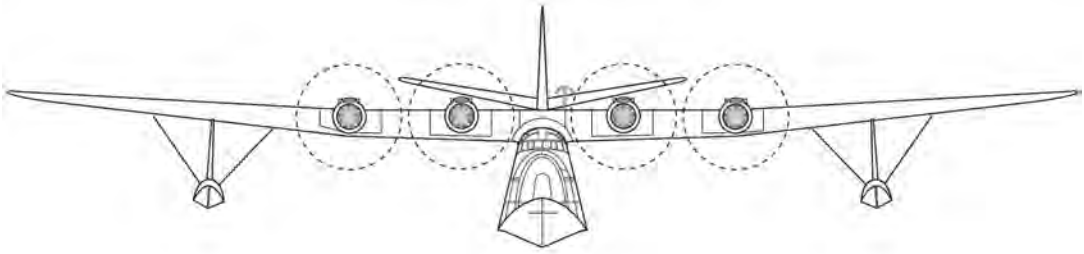
Performance: Max. speed 210-mph, cruise 175-mph; ceiling 18,996 ft.; range 3,598 mi.

Weights: 26,407 lbs. empty, 48,540 lbs. normal gross, 57,500 lbs. max. takeoff.

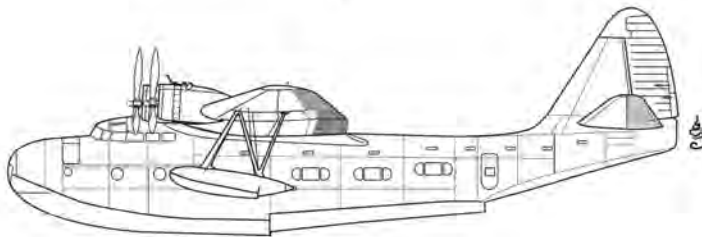
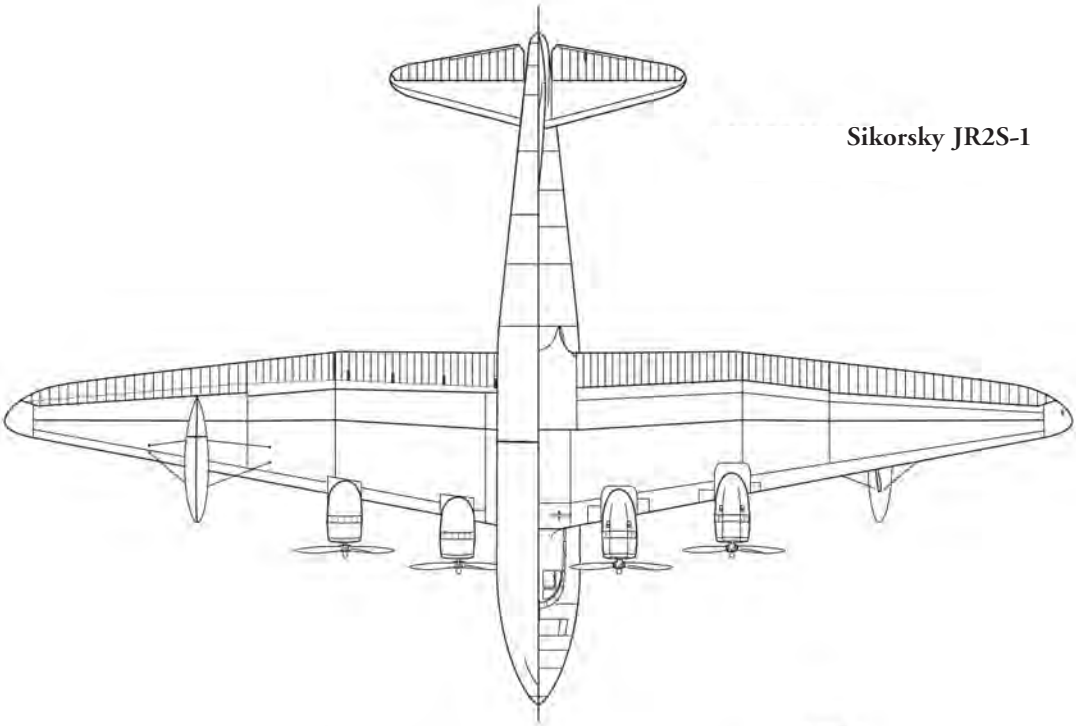
Dimensions: Span 124 ft. 0 in., length 79 ft. 3 in., wing area 1,670 sq. ft.

Flown for the first time on August 13, 1937, Sikorsky's model S-44, under the naval designation XPBS-1, was the first of three "Flying Dreadnought" designs to be tested as long-range patrol bombers (see also Consolidated PB2Y and Martin PB2M). Although not selected for production, the XPBS-1 was officially accepted for operational service in early 1939 and thereafter used to evaluate long-range patrol bomber operations up until early 1942, when it was stripped of all armament and re-assigned to VR-2 at NAS Alameda as an over-ocean transport. In its new role, the aircraft was used primarily to move high-value personnel and cargoes between the West Coast and the Hawaiian Islands. On June 30, 1942, while returning from Pearl Harbor, the XPBS-1 struck a log in San Francisco Bay and sank. Included among the passengers and crew, all of whom safely escaped, was Admiral Chester W. Nimitz, Commander of the Pacific Fleet.

In December 1939, American Export Airlines (AEA) approached Sikorsky (by then operating as the Vought-Sikorsky Division of United Aircraft ) with a proposal to build three commercial variants of the XPBS-1 as the VS-44A, followed in June 1940 by a definitive construction contract. Redesigned as a transport, the VS-44A could accommodate 32-passengers in day seating or 16 in sleeper berths, with the same amenities of a Pan American Clipper; but more importantly, it possessed a 3,100-mile range that, fully loaded, would allow it to fly transatlantic routes nonstop. All three VS-44As entered service with AEA between January and June 1942, but shortly after commencing operations, they were officially impressed into the Naval Air Transportation Service



Sikorsky JR2S-1



(NATS) under the military designation JR2S-1. One of the aircraft was destroyed in 1943 during a takeoff from Botswood, England; the other two were released from impressment and returned to AEA control at the end of 1944. In mid-1945, the assets of AEA were acquired by American Airlines, Inc., which planned to discontinue all flying boat operations when hostilities ended, and soon after the last AEA transatlantic flight was completed in late October 1945, both aircraft were offered for sale. The only surviving example, the second VS-44A built, became an





**VS-44A depicted in American Export Airlines markings in 1942. All three VS-44As were impressed onto the Navy inventory as the JR2S-1 and operated under NATS control until the end of 1944.**

exhibit at the New England Air Museum in Bridgeport, Connecticut after being fully restored by ex-Sikorsky employees during the mid-1980s.

## **Lockheed P2V (C-139) Neptune — 1950**

### **Technical Specifications (P2V-3Z)**

Type: Armored VIP transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions (transports): 2 (USN), not including patrol versions.

Capacity: Crew of five plus six passengers.

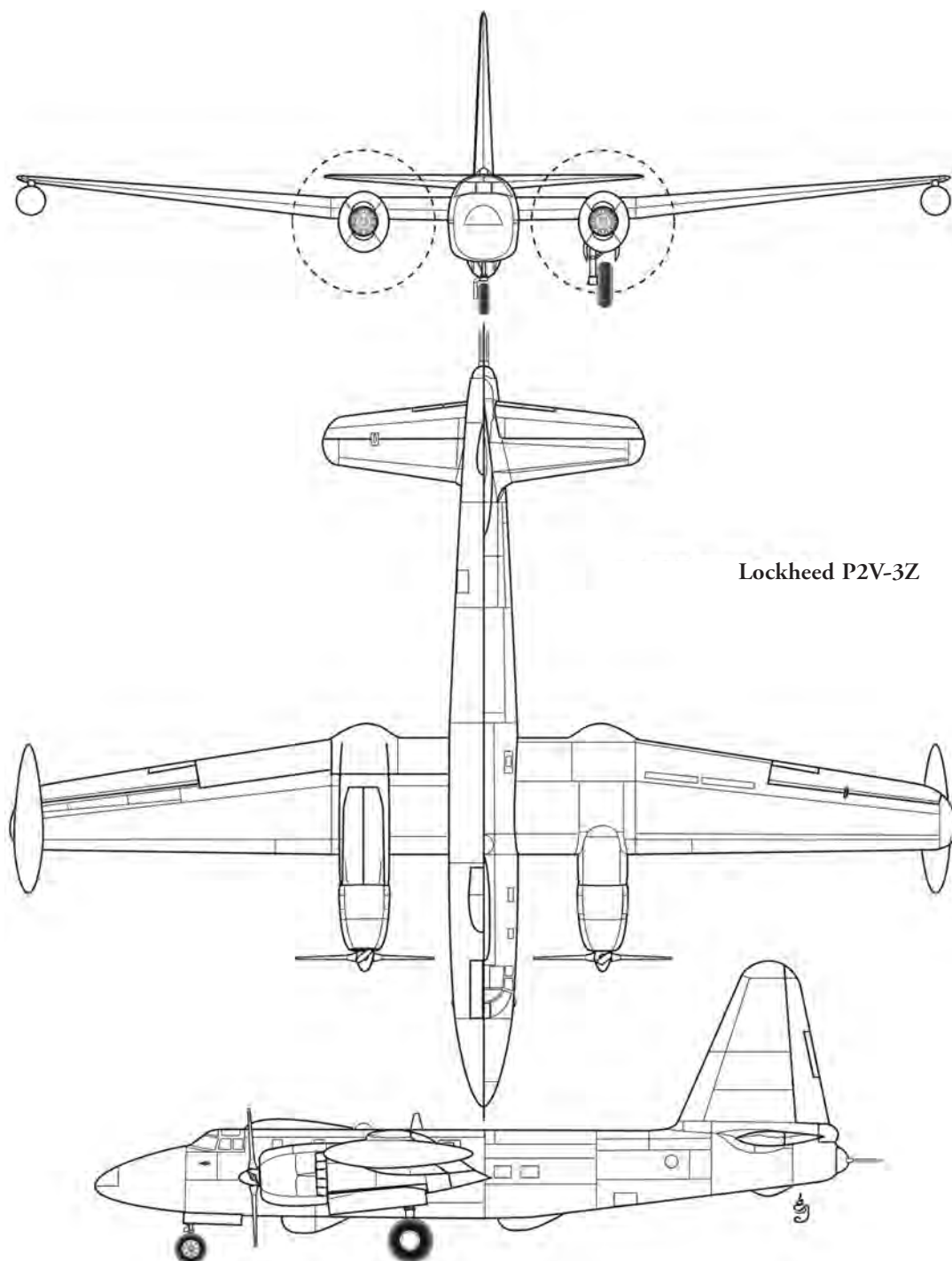
Powerplants: Two 3,200-hp Wright R-3350-26W Double Cyclone 18-cylinder, twin-row air-cooled radial engines driving four-bladed Hamilton Standard fully reversible, constant-speed metal propellers.

Performance: Max. speed 338-mph, cruise 180-mph; ceiling 28,000 ft.; range 2,880 mi.

Weights: 33,962 lbs. empty, 63,078 lbs. max. takeoff.

Dimensions: Span 100 ft., length 77 ft. 10 in., wing area 1,000 sq. ft.

Designed primarily for long-range, land based maritime patrol, the XP2V-1 Neptune made its first flight on May 17, 1945, and a further 1,021 production models built in seven major variants (P2V-1 through P2V-7) were delivered to the Navy between 1946 and 1962. In 1950,



**Lockheed P2V-3Z**



Although official records indicate that both P2V-3Zs operated with VR-23 out of Japan from 1951 until withdrawn in 1955, the photograph suggests that one of them was repainted and assigned to NAS Pensacola.

the last two P2V-3s on Lockheed's assembly were completed as armored VIP transports. Changes from the P2V-3 standard included deleting all armament except the tail turret and adding an armor-plated, six-place cabin aft of the wing featuring two rectangular windows on each side and access through an airstair door on the left. Following delivery in September 1950, both P2V-3Zs entered service with Hawaii-based VR-21 from which they commenced operations as staff transports in Korea. In addition to military VIPs, these aircraft were reportedly used to fly congressional and other government officials around the combat zone. In 1951 both P2V-3Zs were reassigned to VR-23 out of NAS Atsugi, Japan, and served there until withdrawn from active list in 1955. Late in its career, the designation C-139 was reserved for a proposed transport conversion of the P2V-7 (P-2H after 1962) but never used.

## Consolidated PB2Y Coronado — 1943

### Technical Specifications (PB2Y-5R)

Type: Long-range logistical transport.

Manufacturer: Consolidated Aircraft Corp., San Diego, California.

Total military versions (transports): 50+ (USN).

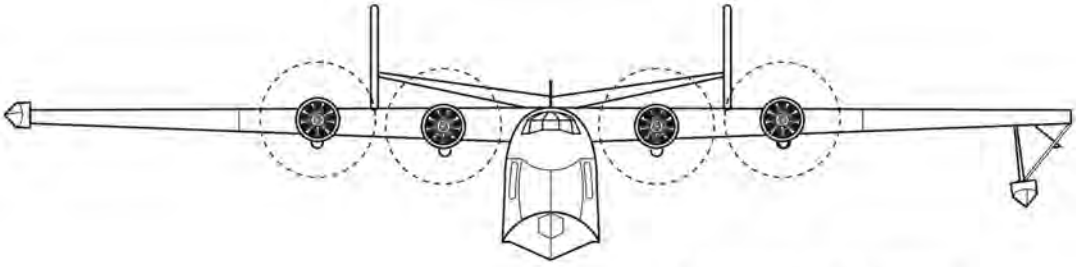
Capacity: Crew of five plus 44 passengers or 16,000 lbs. of cargo.

Power plants: Four 1,200-hp Pratt & Whitney R-1830-92 *Twin Wasp* 14-cylinder, twin-row air-cooled radial engines driving three-bladed, constant-speed metal propellers outboard and four-bladed, fully reversible propellers inboard.

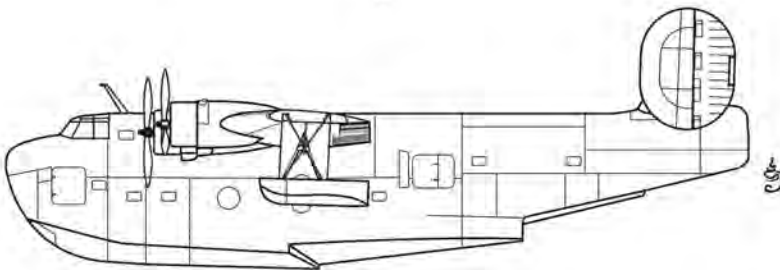
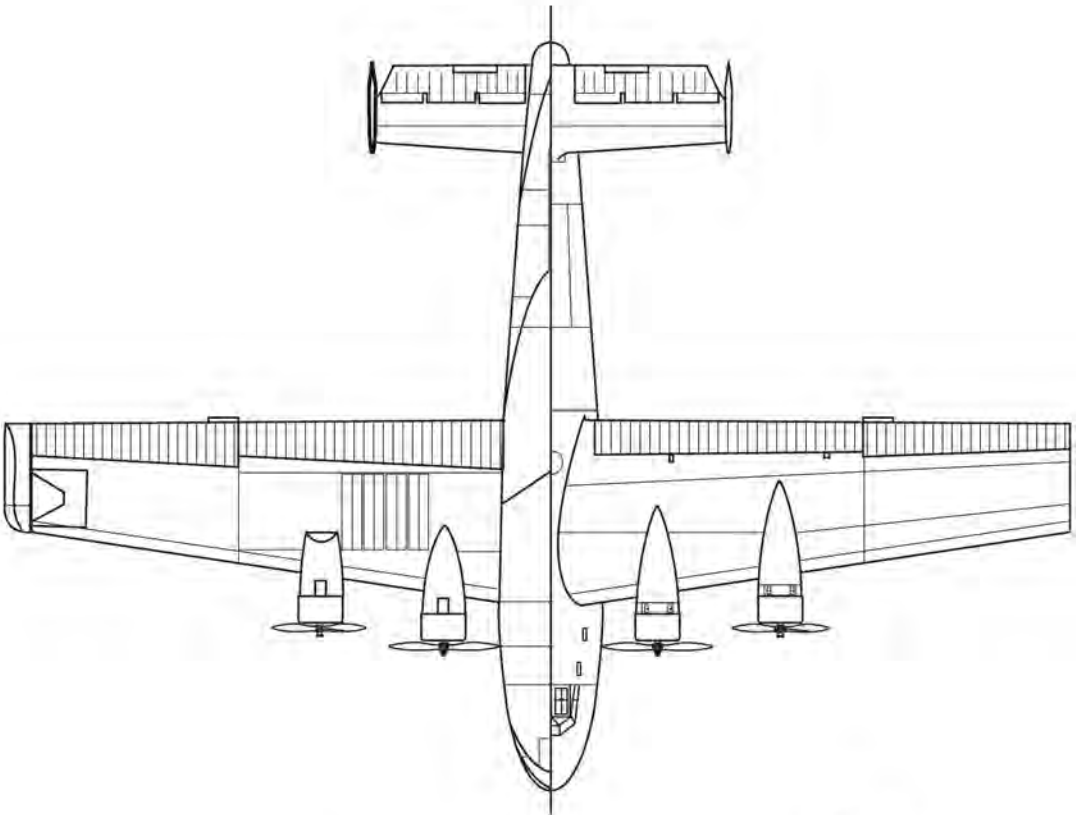
Performance: Max. speed 211-mph, cruise 154-mph; ceiling 13,100 ft.; range 1,640 mi. (normal loaded), 2,570 mi. (max.).

Weights: 33,180 lbs. empty, 66,000 lbs. max. takeoff.

Dimensions: Span 115 ft., length 79 ft. 3 in., wing area 1,780 sq. ft.



**Consolidated PB2Y-3R**





**Early 1943 photograph of PB2Y-3R soon after conversion from patrol-bomber to transport. Most were assigned to VR-2 out of NAS Alameda, California, to fly long-distance routes to Pacific bases.**

The Consolidated XPB2Y-1 prototype was flown for the first time on December 17, 1937, as the second of three “Sky Dreadnoughts” (see also Sikorsky PBS and Martin PB2M) to be evaluated by the Navy as long-range patrol bombers. In March 1939, after the prototype had been tested for over a year and subjected to numerous modifications, BuAer authorized Consolidated to proceed with construction of six substantially redesigned PB2Y-2s that would be used for operational evaluations and training. But in November 1940, even before the first PB2Y-2 had been accepted, Consolidated received a contract for 210 production aircraft, 177 to be delivered to the Navy as the PB2Y-3 and thirty-three to Great Britain as the PB2Y-3B. Heavier by 5,700 lbs., the PB2Y-3 featured self-sealing fuel tanks, 2,000 lbs. of armor protection in vital areas, twin-gun power-operated turrets in the bow, dorsal, and tail positions, plus two flexible waist guns.

Production PB2Y-3s began reaching patrol squadrons during the summer of 1942; however, by this time, the Sky Dreadnought concept had been overtaken by other wartime priorities. Instead, with their capacious hulls and superior range, the PB2Ys could be better used to fulfill a Naval Air Transportation Service (NATS) need for over-ocean transports. In October 1943, when 136 PB2Y-3s had been delivered, the 41 remaining airframes were consigned to Rohr Aircraft Corp. to be completed as unarmed PB2Y-3R transports. The -3Rs, weighing 8,000 lbs. less, could be configured to carry up to forty-four passengers or 16,000 lbs. of cargo. During 1944, as more land-based aircraft entered Navy service to assume the maritime patrol role, some PB2Y-3s were withdrawn from patrol units and subsequently modified to serve as transports. PB2Y-3s refitted with low-altitude R-1830-92 engines (single-stage superchargers) returned to service as PB2Y-5Rs and some configured for twenty-five medical litters became the PB2Y-5H. Most PB2Y-3Rs and -5Rs were assigned to VR-2 out of NAS Alameda, California, where they were used extensively on the transpacific routes between the West Coast, Hawaii, and the South



Pacific Theater. All were withdrawn from service and scrapped soon after the war ended. The only known surviving example, a PB2Y-5R, now resides as an outdoor exhibit at the Naval Aviation Museum in Pensacola, Florida.

## RA (see Fokker C-2, -5, and -7 in Part A)

### Budd RB (C-93) Conestoga—1943

#### Technical Specifications (RB-1)

Type: Tactical transport and air ambulance.

Manufacturer: Edward G. Budd Mfg. Co, Philadelphia, Pennsylvania.

Total military versions: 17 (USN).

Capacity: Crew of two plus 24 troops, 24 medical litters, or 9,600 lbs. of cargo.

Powerplants: Two 1,200-hp Pratt & Whitney R-1830-92 *Twin Wasp* 14-cylinder, twin-row air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 197-mph, cruise 165-mph; ceiling (not reported); range 1,620 mi.

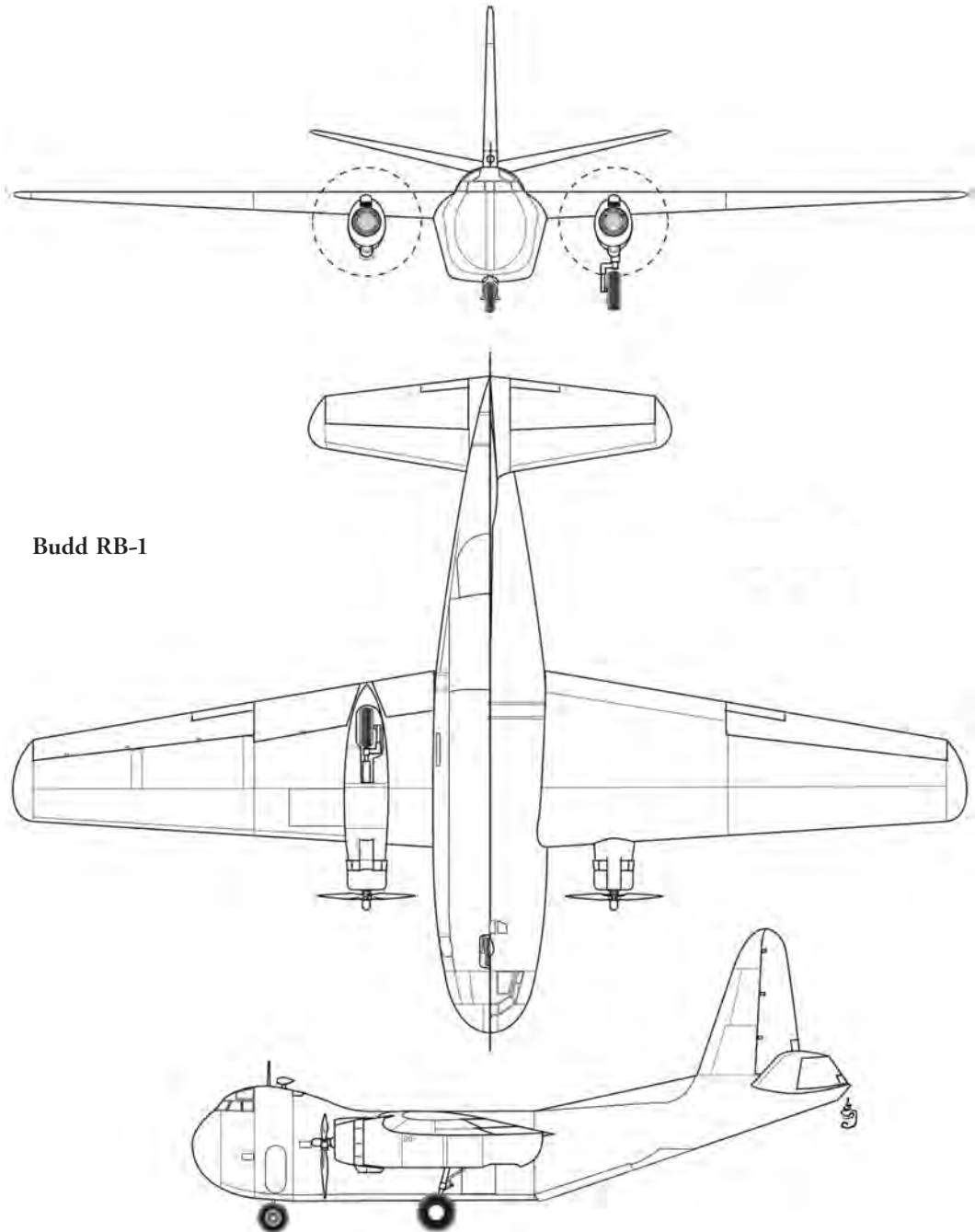
Weights: 20,156 lbs. empty, 33,860 lbs. max. takeoff.

Dimensions: Span 100 ft., length 68 ft., wing area 1,400 sq. ft.

Though not itself a success, the general layout of the Budd RB-1 Conestoga became a leading influence in postwar tactical transport designs like the Fairchild C-123 and Lockheed C-130. Its origins are traceable to mid-1941 when the War Department circulated requirements



Navy RB-1 shown loading ambulance via rear ramp during wartime acceptance trials. Construction—airframe and skin—was entirely stainless steel. Only 17 delivered when the contract was canceled.

**Budd RB-1**

for a twin-engine transport, comparable in performance to the Douglas C-47, to be constructed of “non-strategic materials” and built to a design optimized for tactical combat operations. At the time, government officials feared that the thousands of new aircraft needed for the war effort might create critical shortages of aluminum and other light alloys. The AAF’s Curtiss C-76 and Fairchild C-82 reported in Part A, both of which were to be constructed of wood, sprang from this requirement. A third respondent, the Edward G. Budd Mfg. Co., approached the Navy

Department with a proposal to design and build a transport to the same requirements but made almost entirely of stainless steel. An established manufacturer of stainless steel-clad rolling rail stock, Budd had originated the shot-weld technique. After considering the proposal, BuAer awarded Budd a contract in August 1942 to deliver 200 aircraft under the designation RB-1 (no experimental prototype) and sometime afterward, the AAF followed with an order to produce 600 essentially identical transports under the designation C-93A. Besides its stainless steel airframe, the RB-1 appeared with a high-wing, tricycle gear arrangement, designed to be loaded from the rear at truck-bed height. An elevated flight deck and upswept tail group left an unobstructed 25-ft. × 8-ft. × 8-ft. main cargo bay that could be rigged to house either 24 fully equipped troops, 24 medical litters, one vehicle up to 1½ tons, or 9,600 lbs. of cargo, and rapid loading/unloading was aided by an electrically operated ramp incorporated into the aft fuselage.

The first flight of the RB-1 under civil registration NX37907 took place from Budd's Philadelphia plant on October 31, 1943, and it was delivered to NAS Patuxent River, Maryland for official trials in March 1944 but was completely wrecked in a crash just a month later. Testing of other RB-1s subsequently revealed that the aircraft was relatively underpowered for its weight (3,000 lbs. heavier than the C-47 empty, with the same R-1830-92 engines) and suffered from poor flying characteristics, and at gross weight, range decreased to only 650 miles. A combination of factors — unsatisfactory performance, production delays caused by the stainless steel fabrication process, and abundant supplies of aluminum — led BuAer to reduce Budd's order from 200 to 25 aircraft; and the AAF contract was canceled altogether. Although the Navy ultimately accepted delivery of 17 RB-1s, none ever reached operational service, and all were stricken from the inventory in early 1945 and transferred to the War Assets Administration (WAA) to be sold surplus. Of the 12 RB-1s purchased by National Skyway Freight Corp. (became Flying Tiger Lines in 1947), seven were operated briefly on domestic cargo routes until being replaced with war-surplus C-47s.

## Curtiss RC Kingbird — 1931

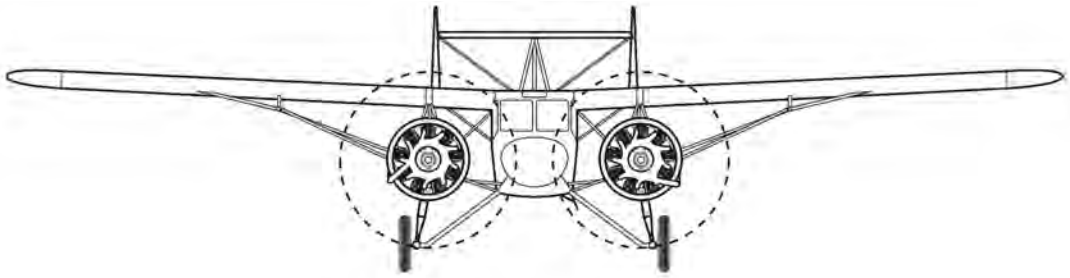
### Technical Specifications (RC-1)

Type: Utility transport.

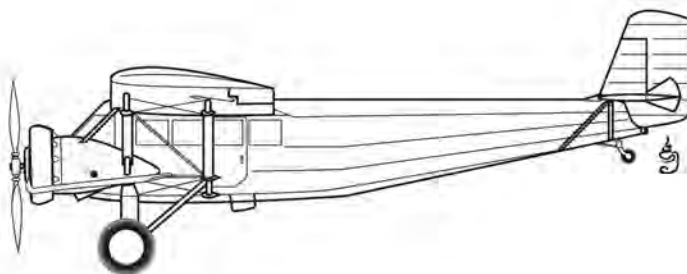
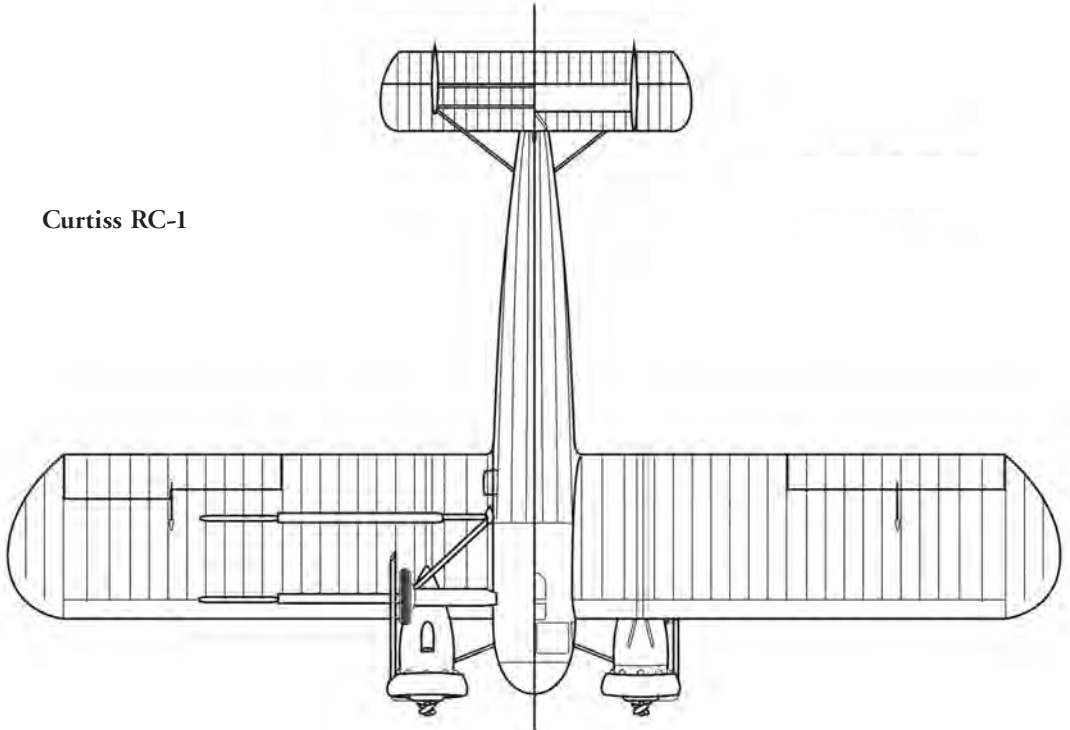
Manufacturer: Curtiss Aeroplane and Motor Co., Garden City, New York.



Only example of a military “Kingbird,” the sole RC-1 was delivered to the Marines in 1931 to be used as a utility transport and air ambulance. Assigned initially to VF-9M in Quantico, then to VF-7M in San Diego until 1936.



Curtiss RC-1



Total produced: 1 (USMC).

Capacity: One pilot plus seven passengers or 2,361 lbs. of cargo.

Powerplants: Two 300-hp Wright J-6-9 (R-975) *Whirlwind* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard fixed-pitch metal propellers.

Performance: Max. speed 138-mph, cruise 112-mph.; ceiling 16,500 ft.; range 455 mi.

Weights: 3,280 lbs. empty, 6,115 lbs. loaded.

Dimensions: Span 54 ft. 6 in., length 34 ft. 10 in., wing area 327 sq. ft.

The Curtiss Model 55 Kingbird, a twin-engine derivative of the Thrush, initially entered service with Eastern Air Transport in 1929 as a small airliner. Its most noticeable characteristics were a twin-finned, biplane empennage and strut-mounted engine nacelles that placed the propeller arcs in front of the aircraft's blunt nose. The Navy purchased a single Model 55 in March 1931 as the JC-1, but placed it into service as the RC-1. Following delivery, the aircraft was assigned to the Marines, serving with VF-9M at Quantico for two years, then transferring to VJ-7M at San Diego, where it was employed as a transport and air ambulance until the middle of 1936.

### **R4C (see Curtiss C-30 in Part A)**

### **R5C (see Curtiss C-46 in Part A)**

## **Douglas RD (C-21, C-26, C-29, and OA-3) Dolphin—1931**

### **Technical Specifications (RD-4)**

Type: Utility transport and rescue amphibian.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.

Total military versions: 41 (24 USN/ USMC/USCG; 17 AAC).

Capacity: Crew of two plus six passengers or 2,950 lbs. of cargo.

Powerplants: Two 450-hp Pratt & Whitney R-1340-96 *Wasp* 9-cylinder air-cooled radial engines driving two-bladed Hamilton Standard, ground-adjustable metal propellers.

Performance: Max. speed 147-mph; ceiling 14,900 ft.; range 660 mi.

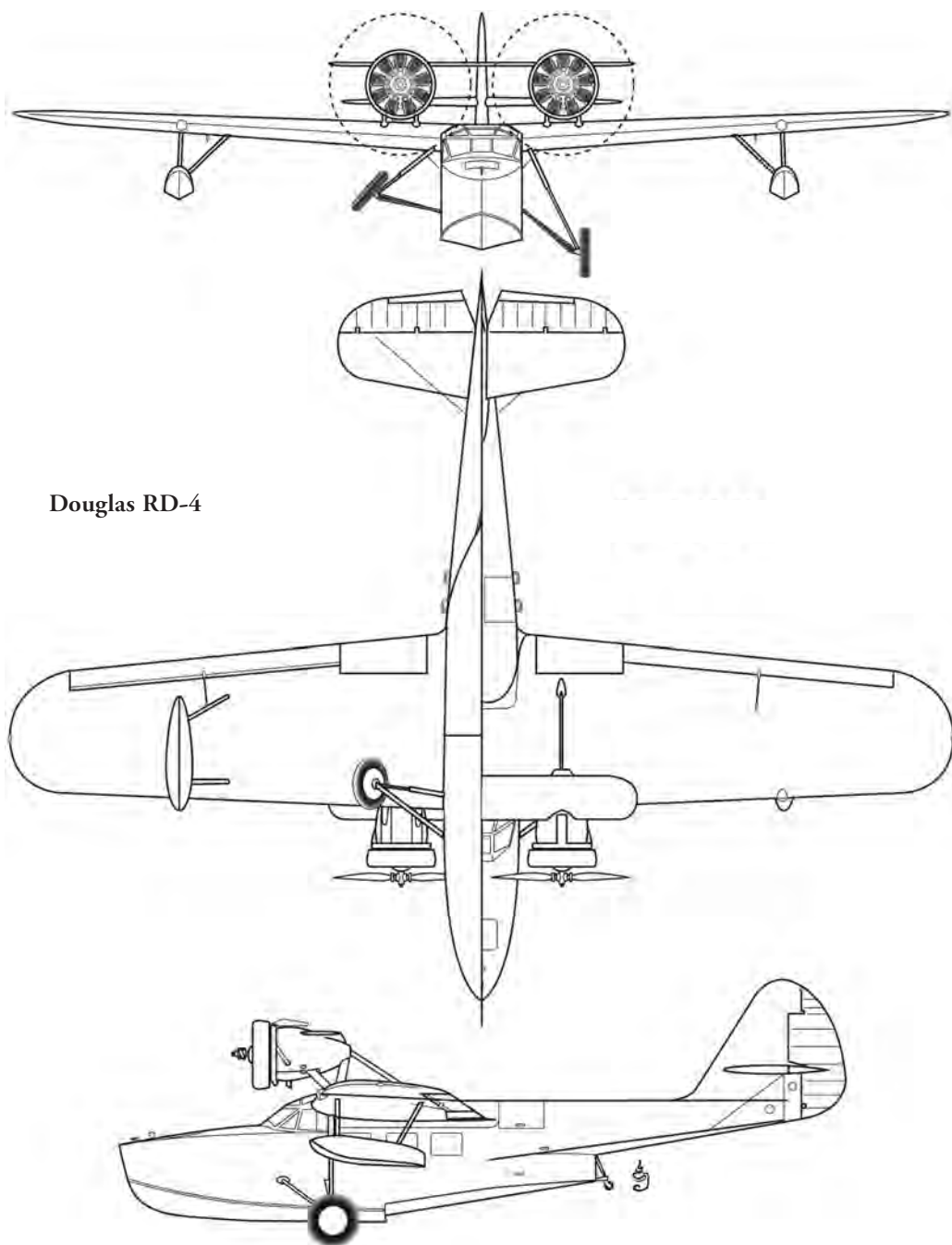
Weights: 6,467 lbs. empty, 9,737 lbs. loaded.

Dimensions: Span 60 ft. 10 in., length 45 ft. 3 in., wing area 592 sq. ft.

Completed in July 1930 as the non-amphibious Sinbad under civil registration NX145Y, Douglas's first in-house seaplane design was initially conceived as a "flying yacht" to be offered on the civilian market. The Sinbad appeared as a monoplane having an all-metal hull of semi-monocoque construction and a two-spar cantilevered wing covered in plywood that featured slotted, Handley Page-type ailerons. In original configuration, the 300-hp Wright J-5C *Whirlwind* engines were mounted directly above the wing and encased in nacelles that blended-in with its upper surface. After flight-testing revealed the need to raise the thrust line, the engines were moved above the wing on struts, along with an auxiliary airfoil mounted between the conical engine nacelles to add structural support and lift. When no civilian buyers surfaced, the Sinbad was sold to the Coast Guard in March 1931 for \$31,500, where it was operated for a period of time as call-sign "24 G" without a military designation but later simply listed as the "RD" with no numeric suffix.

The improved civil Dolphin, equipped with amphibious landing gear, a modified hull, and





Douglas RD-4

uprated engines, emerged in early 1931, and later the same year, BuAer purchased one example powered by 350-hp Wright R-975-3 *Whirlwind* engines and placed it in service as the XRD-1. Twenty-three more Dolphin variants were procured for the Navy and the Coast Guard between 1932 and 1934: three RD-2s in early 1933, two delivered to the Navy and one to the Coast Guard, powered by 450-hp Pratt & Whitney R-1340-10 engines; six very similar RD-3s in mid-1933 to the Navy; and ten RD-4s in late 1934 to the Coast Guard, powered by 450-hp



One of two RD-2s ordered by the Navy in 1932. This example entered service in 1933 with the Utility Unit based at Coco Solo in the Canal Zone.



One of eight Dolphins procured by the Air Corps in 1932 as the Y1C-21, later redesignated OA-3. Note addition of finlets to the horizontal stabilizer.

R-1340-96 engines. One of the Navy RD-2s was specially outfitted for President Franklin D. Roosevelt, but there is no record of it ever having been used for such purpose. Navy RDs were typically assigned to utility squadrons and used primarily as transports, whereas Coast Guard versions saw extensive service in the search and rescue role as flying lifeboats. Two RD-3s were subsequently assigned to the Marine Corps to be used as utility transports. One Dolphin manufactured as an RD-2 but not placed on the naval inventory was used as a government transport by the Secretary of the Treasury until 1937. At least two Navy RD-3s and four Coast Guard RD-4s served during early World War II, the last being withdrawn in 1943.

*AAC Variants:* During the early 1930s the AAC operated 17 Douglas Dolphin amphibians under a variety of designations, differing mainly in powerplants and interior details. Eight equipped with 350-hp Wright R-975-3 engines were purchased in 1932 as the Y1C-21 (re-designated OA-3 in 1933); also in 1932, seven more entered service as the C-26, two with 300-hp Pratt & Whitney R-985-1s as the Y1C-26 (later OA-4), one with 350-hp R-985-5s as the Y1C-26A (later OA-4A), and four with 350-hp R-985-9 engines as the C-26B (later OA-4B). A final Dolphin with 575-hp Pratt & Whitney R-1340 engines was acquired in 1933 as the C-29. A number of these aircraft were reportedly rebuilt with stainless steel wings during the mid-1930s. All had apparently been withdrawn prior to World War II.

## R2D (see Douglas C-32 and C-34 in Part A)

### Douglas R3D (C-110)—1940

#### Technical Specifications (R3D-1)

Type: Passenger, cargo and tactical transport.

Manufacturer: Douglas Aircraft Co., El Segundo, California.

Total military versions: 8 (7 USN, USMC; 1 AAF).

Capacity: Crew of three plus 16 passengers or troops or 4,500 lbs. of cargo.

Powerplants: Two 1,000-hp Wright R-1820-44 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed, constant-speed metal propellers.

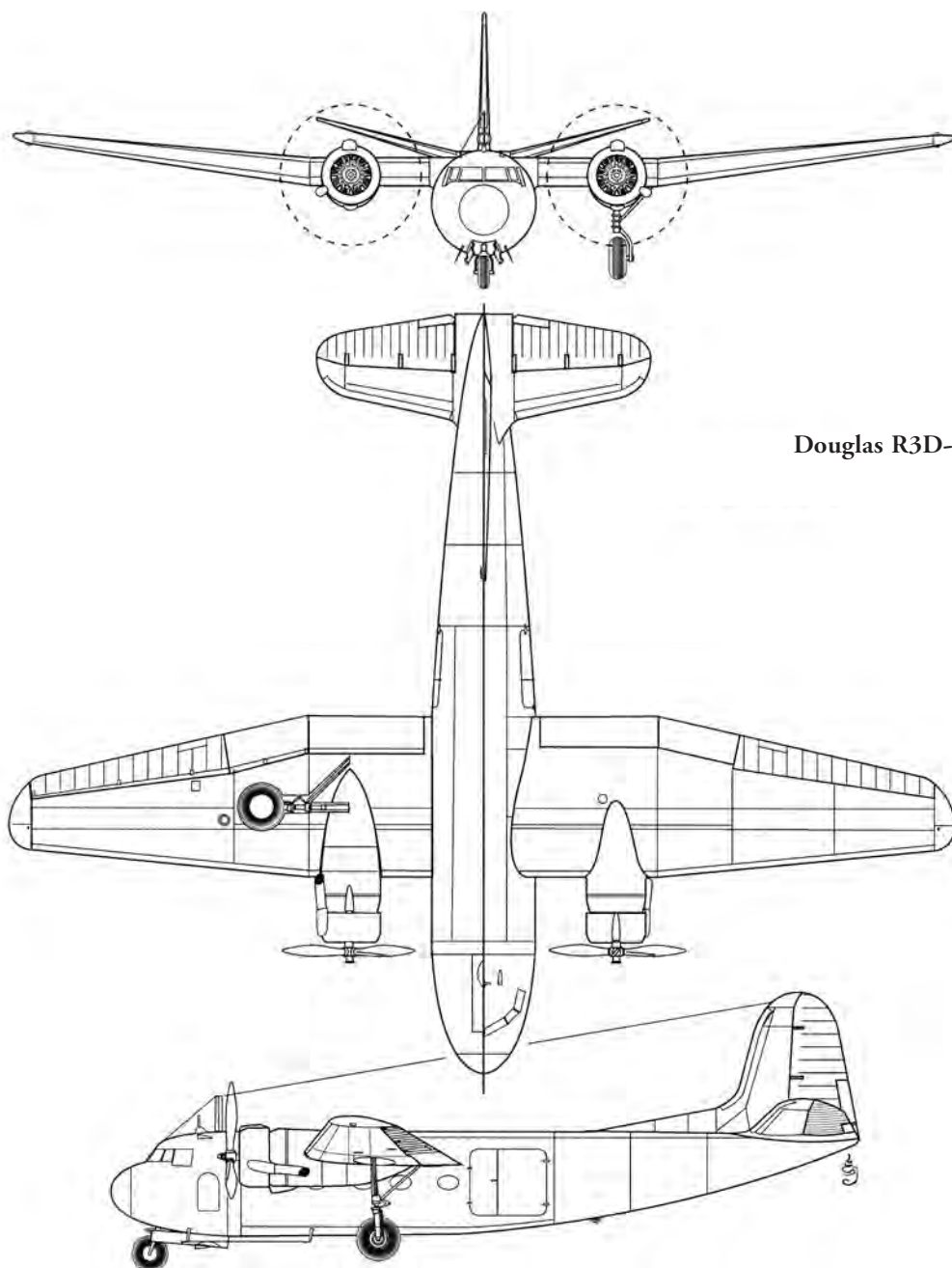
Performance: Max. speed 221-mph at 5,800 ft.; ceiling 19,000 ft.; range 1,440 mi.

Weights: 14,188 lbs. empty, 21,000 lbs. gross.

Dimensions: Span 78 ft. 0 in., length 62 ft. 2 in., wing area 824 sq. ft.

In mid-1938, while its DB-7 twin-engine bomber prototype (later became the A-20) was at an advanced stage of construction, the Douglas plant at El Segundo embarked upon the design of the DC-5, a 16-passenger short-haul airliner having a high-wing, tricycle gear layout similar to that of the bomber. The company expected that the plane would be capable of operating out of shorter airfields over shorter routes at the same economy of its DC-3. The design of the DC-5 emerged 25 percent larger than the DB-7, featuring a completely new circular-section fuselage, and wing area was increased chord-wise and span-wise in order to create a load factor comparable to that of the DC-3 (i.e., 25.5 lbs. per square foot). For operations from shorter airfields, the wings incorporated fully articulated trailing edge flaps running from the wing root to the ailerons. The under-wing position of the circular side windows would provide passengers with unsurpassed visibility and the stance of the tricycle gear gave them easy access through a side door plus a level center aisle to walk on. Although potential airline customers had the option of specifying powerplants, the prototype was equipped with a pair of 900-hp Wright GR-1820-F62 *Cyclones*.

By the time the aircraft was ready to fly, Douglas had received advance orders for 21 civil



Douglas R3D-2

versions plus seven more for the Navy. BuAer planned to allocate three to Naval Air Stations as staff transports under the designation R3D-1 and four slightly different versions to the Marines as the R3D-2. The DC-5 prototype made its first flight on February 20, 1939, but the test program ran into immediate difficulties due to a serious tail-buffeting problem encountered during certain phases of flight. While the El Segundo engineering staff worked to solve the problem, all but four of the airline pre-orders were canceled. The buffeting was traced to turbulence created by engine thrust above the horizontal stabilizers and elevators and eventually corrected



The only Douglas DC-5s built to a military specification, two R3D-2s were delivered to the Marines in 1940 for planned paratrooper training. The Navy also used three civil versions as the R3D-1 and -3.

by adding fifteen degrees of dihedral to the horizontal tailplane. A dorsal fillet was also added the vertical fin to enhance directional stability.

The first R3D-1, completed during the spring of 1940, crashed in June while being tested at the factory. The next two R3D-1s were delivered without incident in July 1940, and both assigned to NAS Anacostia. Between September and November the same year, the four R3D-2s entered service with the Marines, two with VMJ-2 (later VMJ-252) at MCAS Ewa, Hawaii and two with VMJ-1 (later VMJ-152) at MCAS Quantico, Virginia. The R3D-2s differed from the -1s in having cargo doors on the port side, more seats (22), a reinforced cabin floor, and less fuel capacity in order to increase other payloads. Although the type's aerodynamics problems had been fully resolved, production was limited to the twelve aircraft completed by the end of 1940 as a result of new wartime contracts imposed on El Segundo's facilities (i.e., production of SBDs and A-20s). During World War II, one R3D-1 operated as a staff transport in the continental U.S. while the other served in Australia until damaged beyond repair in early 1945. The original DC-5 prototype, purchased by William E. Boeing as a personal transport, was commandeered by the Navy in February 1942 as the R3D-3 and later used as a testbed for instrument landing systems. Of the four Marine R3D-2s, one was shot down by a Japanese submarine off the Australian coast in early 1942 and the other three served out the war as VIP transports in the continental U.S. All surviving Navy and Marine R3Ds had been removed from the active list by the end of 1946.

*AAF Variants:* At least three DC-5s registered to Dutch KLM airlines were thought to have been used by American military forces in Australia between 1942 and 1944, however, only one is known to have officially been impressed into AAF under the designation C-110. After being sold to Australian National Airways, the C-110 was secretly purchased in 1948 for the newly established Israeli Air Force. No DC-5s survive today.



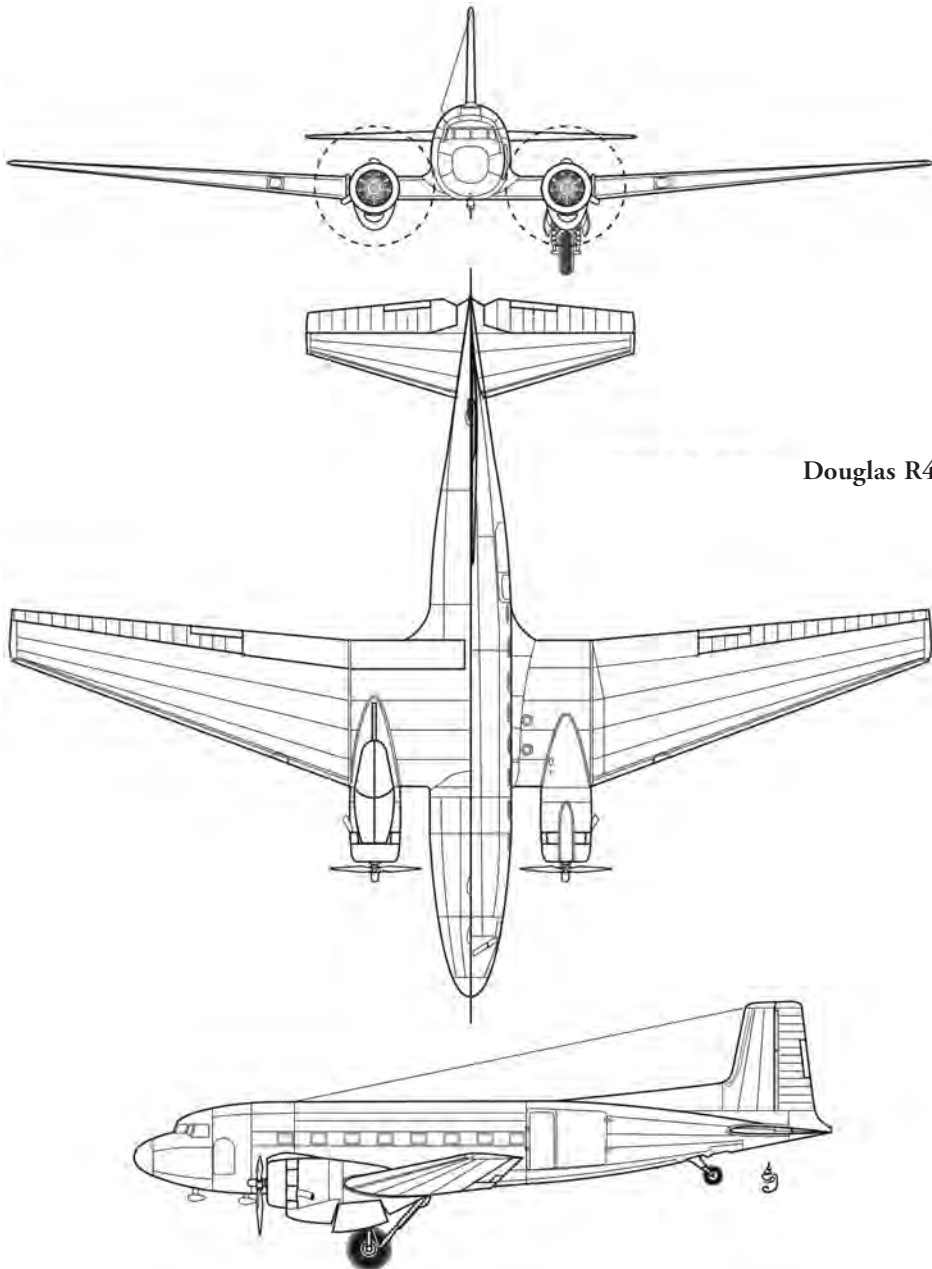
## **R4D (see Douglas C-47 in Part A)**

### **R4D-8 (C-117D)—1949**

#### **Technical Specifications (R4D-8)**

Type: Passenger, cargo, and tactical transport.

Manufacturer: Douglas Aircraft Co., Santa Monica, California.



**Douglas R4D-8**

Total military versions: 101 (USN, USMC).

Capacity: Crew of three plus 33 passengers or troops or 7,000 lbs. of cargo.

Powerplants: Two 1,475-hp Wright R-1820-80 *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 270-mph, cruise, 238-mph; ceiling 22,000 ft.; range 2,500 mi.

Weights: 19,537 lbs. empty, 31,000 lbs. loaded.

Dimensions: Span 90 ft., length 67 ft. 9 in., wing area 969 sq. ft.

The R4D-8/C-117D is reported separately here based on the fact it represents an extensive modification of the original DC-3 airframe and made its appearance nearly 14 years later. The original impetus behind the DC-3S or Super DC-3 arose during the late 1940s over concerns that progressively more stringent CAA airworthiness standards would ground large numbers of civil DC-3s and ex-military C-47s by 1952. In response, Douglas offered operators a major rebuild and modification program at a cost between \$250,000 to \$300,000 per aircraft, such as: a strengthened fuselage, lengthened four feet; new outer wing panels of slightly reduced span having squared tips and four degrees of sweepback in the trailing edges to compensate for the shift in center-of-gravity; enlarged tail surfaces with squared edges; more powerful engines (initially 1,450-hp R-2000-8s) with new cowlings and injector-type exhausts; main wheel well doors; a partially retractable tail wheel; flush riveting; and low-drag antennas. After making its first flight on June 23, 1949, the Super DC-3 prototype quickly demonstrated that it would carry eight more passengers (38) about 20 percent faster and farther than a stock DC-3; however, civil carriers showed little interest, with only three conversions being sold to Capitol Airlines.

In an attempt to attract military orders, Douglas turned the prototype over to the USAF in 1950 to be evaluated as the YC-129 (later re-designated YC-47F), then in 1951, after the



The “Super DC-3”/R4D-8 had its longest career with the Marines, from 1952 to 1982. This example is seen at MCAS El Toro, California in the late 1950s while assigned to Maintenance and Repair Squadron 37.

USAF instead elected to buy Convair C-131s (see in Part A), Douglas loaned the aircraft to the Navy. Success finally came when, following trials, BuAer purchased the prototype and gave Douglas a contract to convert 100 R4D-5s, -6s, and -7s that would be redelivered under the new designation R4D-8. The BuAer specification called for a change to R-1820-80 engines, reinforced floors, and rear double cargo doors. After entering service during 1952 and 1953, a number of R4D-8s modified for special duties received designation suffixes as follows: six fitted with skis and cold weather equipment as the R4D-8L; six converted for navigation training as the R4D-8T; and an unspecified number equipped 16-seat VIP interiors as the R4D-8Z.

Most Navy R4D-8s initially served with Fleet Logistics Support Squadrons (i.e., VR-1, -3, -13 -22, -24, and -32) and some arrived in time to participate in the last year of the Korean War. When the tri-service designation system went into effect in September 1962, the R4D-8 became the C-117D, the R4D-8L the LC-117D, the R4D-8T the TC-117D, and the R4D-8Z the VC-117D. In their later careers, many Navy R4D-8s were assigned to various air stations as utility and personnel transports, with the very last example being retired from NAS Pensacola in July 1976. R4D-8L/LC-117Ds assigned to VX-6, identifiable by their day-glo paint schemes, operated in the Antarctic in the 1950s and 1960s. Marine R4D-8s were typically attached to headquarters squadrons (HEDRONs) within its three air wings, where, in addition to logistical duties, they were also used to drop flares for night air strikes. In support of Marine operations in Southeast Asia (1965–1972), R4D-8s were commonly employed for operational support airlift (OSA) missions, flying supplies in and out of firebases in South Vietnam. The last Marine R4D-8 was retired from MWHs-1 in 1982.

## R5D (see Douglas C-54 in Part A)

## R6D (see Douglas C-118 in Part A)

## Bellanca RE/JE—1932

### Technical Specifications (XRE-1)

Type: Utility transport.

Manufacturer: Bellanca Aircraft Corp., New Castle, Delaware.

Total military versions: 4 (USN/USMC).

Capacity: One pilot plus five passengers or 2,008 lbs. of cargo.

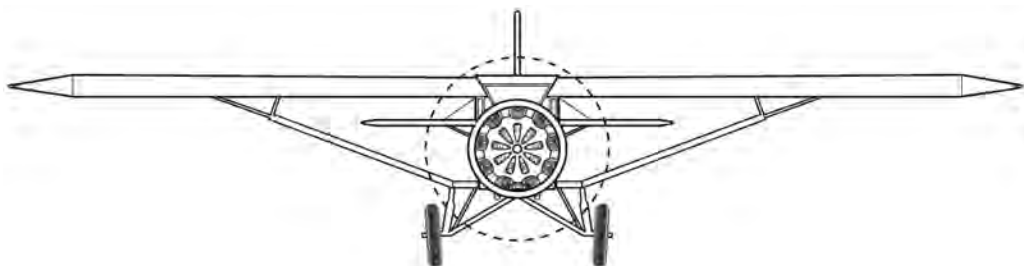
Powerplant: One 420-hp Pratt & Whitney R-1340-C *Wasp* 9-cylinder air-cooled radial engine driving a two-bladed fixed-pitch metal propeller.

Performance: Max. speed 155-mph, cruise 134-mph; ceiling 17,300 ft.; range 670 mi.

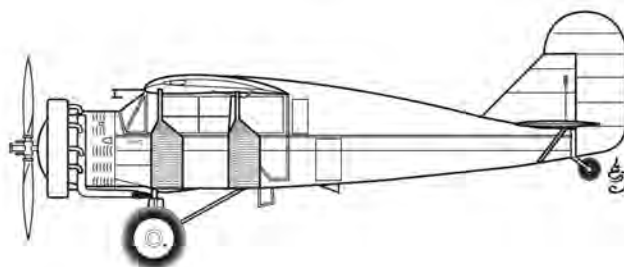
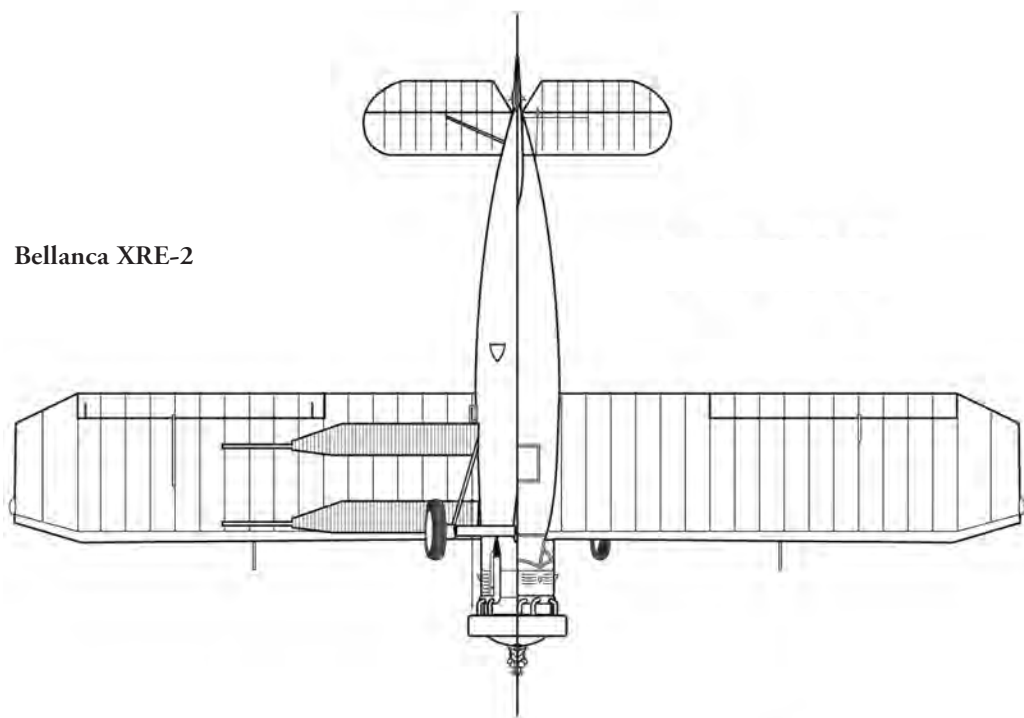
Weights: 2,702 lbs. empty, 4,710 lbs. loaded.

Dimensions: Span 46 ft. 4 in., length 27 ft. 10 in., wing area 255 sq. ft.

The Navy acquired three civil Bellanca Model CH-400 “Skyrockets” during 1932 that were placed in service as the XRE-1, -2, and -3, respectively. Starting with his Air Sedan of 1922, Giuseppe M. Bellanca had evolved a successful series of commercial high-wing monoplanes (WB/CH-200, -300, and -400) that enjoyed reputations as good load carriers with excellent range. The hallmarks of Bellanca’s monoplane designs were a boxy, humped fuselage to accommodate passengers or cargo, broad-chord wings with tapered tips, and large, airfoil section wing struts that added to overall lift. Following official acceptance, the XRE-1 and -2 were retained



**Bellanca XRE-2**



as NAS Anacostia as utility transports and testbeds for radio equipment until being withdrawn during the late 1930s. The XRE-3 was assigned to Marine squadron VJ-6M (later VMJ-1) at Quantico and used there as a two-litter air ambulance until 1938.

In 1938, under the designation JE-1, the Navy procured a single Bellanca Model 31-42 “Super Skyrocket” to serve as a utility transport at NAS Lakehurst in New Jersey. Powered by a 570-hp R-1340-27, the larger JE was characterized by enlarged fin and rudder area, cantilevered



This XJE-3, one of three Bellanca CH-400s procured by the Navy in 1933, was assigned to VJ-6M at MCAS Quantico, where it was used as an air ambulance until 1938.

landing gear, and a close-fitting bump cowling. This aircraft was listed as still active at NAS New York in December 1941.

## Kinner RK—1936

### Technical Specifications (XRK-1)

Type: Utility transport.

Manufacturer: Kinner Airplane & Motor Corp. (owned by Security-National Aircraft Corp.), Downey, California.

Total military versions: 3 (USN).

Capacity: One pilot plus three passengers.

Powerplant: One 300-hp Kinner C-7 (R-1044-2) 7-cylinder air-cooled radial engine driving a two-bladed, variable-pitch metal propeller.

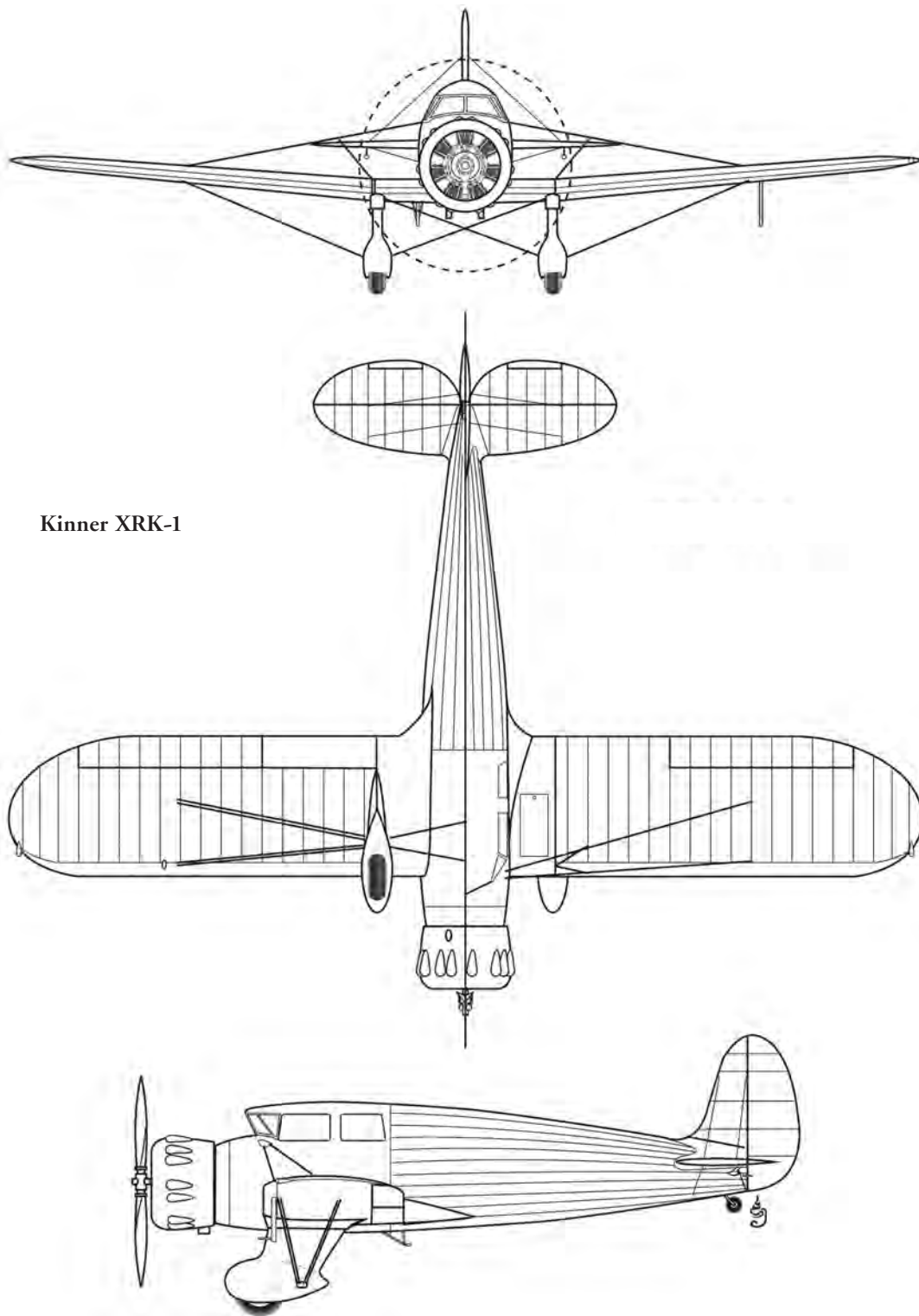
Performance: Max. speed 171-mph; ceiling (not reported); range 700 mi.

Weights: 2,551 lbs. empty, 4,000 lbs. loaded.

Dimensions: Span 39 ft. 9 in., length 28 ft. 7 in., wing area 240 sq. ft.

The Kinner C-7 Envoy was flown for the first time in 1934 as four-place outgrowth of the company's earlier two-seat B-2 Sportster. In general design, like the B-2, it appeared as a fabric-covered, low-wing monoplane with wire-braced wings and spatted undercarriage, with the added features of a close-fitting bump cowling and a noticeably raked forward windscreen. The Navy acquired three of these aircraft in 1936 under the designation XRK-1. One was assigned to the Inspector of Naval Aircraft at Santa Monica, California (where Douglas was located) and another to VJ-5 as a command transport for the commanding officer of NAS San Diego; disposition of the third is not known. The XRK-1 based at San Diego was later refitted with a 400-hp Pratt & Whitney R-985 engine and given a ring cowl. Only one XRK-1 is thought to have still been in service at the time the U.S. entered World War II.





Kinner XRK-1



The Navy procured three Kinner Envoys in 1936 as the XRK-1. This example had been assigned to the Inspector of Naval Aircraft at the Douglas Plant in Santa Monica, California.

## Martin RM (VC-3)—1953

### Technical Specifications (RM-1Z)

Type: VIP and staff transport.

Manufacturer: Glenn L. Martin Co., Baltimore, Maryland.

Total military versions: 2 (USCG).

Capacity: Crew of three plus 40 passengers.

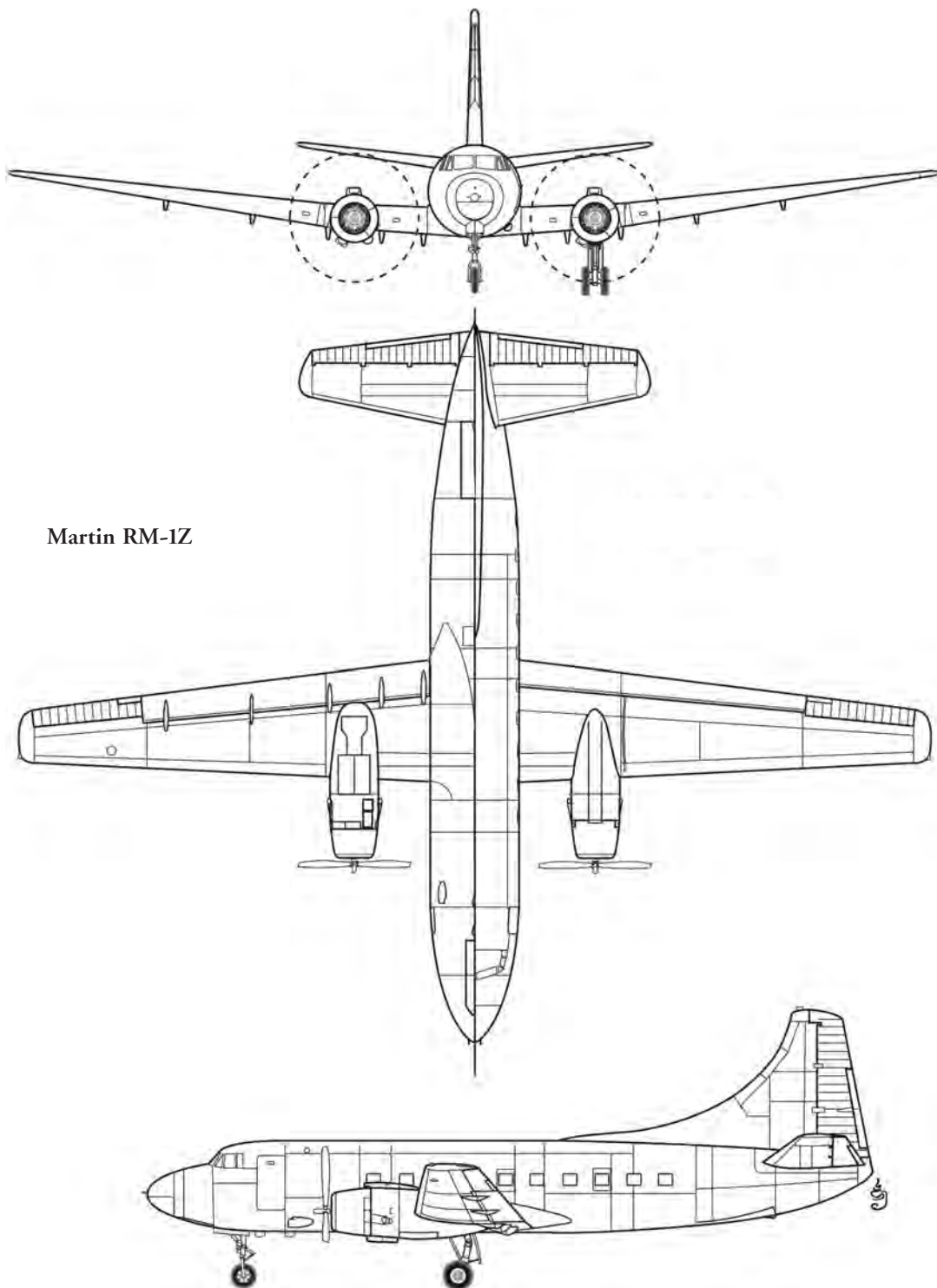
Powerplants: Two 2,400-hp Pratt & Whitney R-2800-34W (CB16) *Double Wasp* 18-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 312-mph, cruise 280-mph; ceiling 27,800 ft.; range 1,080 mi.

Weights: 27,800 lbs. empty, 43,650 lbs. max. takeoff.

Dimensions: Span 93 ft. 3 in., length 74 ft. 7 in., wing area 864 sq. ft.

Martin introduced its structurally improved, lengthened, and pressurized model 4-0-4 in 1950 as a follow-up to its earlier model 2-0-2. After deliveries of the new type to airlines commenced in 1951, the Coast Guard ordered two model 4-0-4s under the initial designation RM-1, then changed it to RM-1G to indicate Coast Guard status, but changed it again to RM-1Z because they had been equipped with VIP interiors. When the two aircraft arrived for service during early 1953, both were assigned to the Coast Guard detachment based at Washington National Airport to be used as executive transports by USCG Headquarters and the Treasury Department. Following adoption of the tri-service system in September 1962, their designation changed from RM-1Z to VC-3A, and in 1967 part of their support mission shifted to the Department of Transportation when that agency assumed control of the Coast Guard. Both VC-3As were removed from service in 1969. The 4-0-4 did enjoy a very long career as a civil airliner, the last commercial flight of one reportedly not taking place until early 2008.



**Martin RM-1Z**



The Treasury Department purchased two VIP-configured Martin 4-0-4s that were placed on the Coast Guard inventory as the RM-1Z. Redesignated VC-3A in 1962, both were retired in 1969.

RO (see Lockheed C-23 and -25 in Part A)

R2O and R3O (see Lockheed C-36 and -37 in Part A)

R4O (see Lockheed C-111 in Part A)

R5O (see Lockheed C-56, -57, -59, -60, and -66 in Part A)

### Lockheed R6O/R6V Constitution—1946

#### Technical Specifications (XR6O-1)

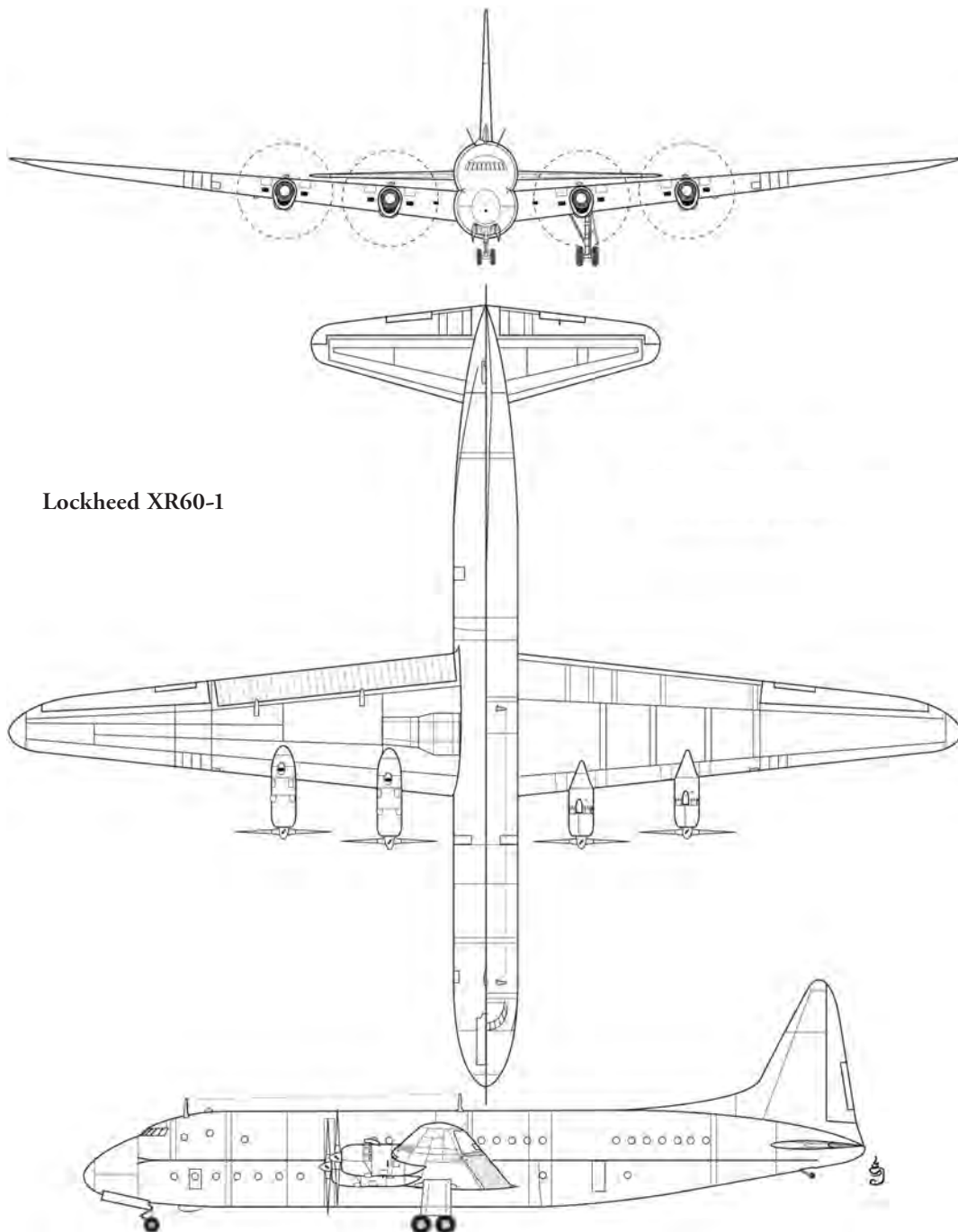
Type: Long-range logistical and passenger transport.

Manufacturer: Lockheed Aircraft Corp., Burbank, California.

Total military versions: 2 (USN).

Capacity: Crew of 12 plus 168 passengers, 204 troops, or 69,425 lbs. of cargo.

Powerplants: Four 3,500-hp Pratt & Whitney R-4360-22W *Wasp Major* 28-cylinder air-cooled radial engines driving four-bladed Hamilton Standard constant-speed metalpropellers.



**Lockheed XR60-1**

Performance: Max. speed 303-mph, cruise 269-mph; ceiling 27,600 ft.; range 5,390 mi.

Weights: 114,575 lbs. empty, 184,000 lbs. max. takeoff.

Dimensions: Span 189 ft. 1 in., length 156 ft. 1 in., wing area 3,610 sq. ft.

The Lockheed R7O/R7V Constitution is noteworthy in having been the largest type of fixed-wing aircraft ever placed in service with the Navy. Work on its design began in June 1942





**First of two XR6O-1 prototypes as seen in late 1946 or early 1947. Disappointing performance and high operating costs resulted in both aircraft being withdrawn by 1953.**

as a joint study between Lockheed, Pan American Airways, and the U.S. Navy to develop a land-plane transport possessing sufficient payload and range to ultimately replace large flying boats on long, transoceanic routes. Pan American was likewise involved in three analogous projects sponsored by the AAF (see Douglas C-74, Boeing C-97, and Convair C-99 in Part A). The broad requirement specified a pressurized aircraft capable of carrying a 17,000 lb. payload over a range of 5,000 miles at speeds of 250-mph or greater. As work at Lockheed continued under the direction of Willis Hawkins as chief engineer, the design of model L-89 emerged with a double-deck fuselage, divided into upper and lower circular lobes in order to minimize frontal cross-section. In a maximum density configuration, the two decks could hold 204 military passengers or alternately, be rigged to carry various combinations of passengers, cargo, or vehicles. Four of Pratt & Whitney's new R-4360 28-cylinder radial engines, expected to deliver 3,000-hp, were selected to power the huge aircraft. To support an anticipated takeoff weight of 90-tons, Lockheed designed a double-strut main landing gear with two wheels per strut.

BuAer initially awarded Lockheed a contract to build two model L-89 prototypes under the designation XR6O-1 with a provisional letter of intent for up to 50 production aircraft; however, due to other wartime priorities and the amount of space needed for the project, construction of the first prototype did not actually start until 1945, and as a result of the V-J cutbacks later that year, BuAer limited the contract to the two XR6O-1s. The first prototype, dubbed *Constitution* by the factory and powered by 3,000-hp R-4360-18s, made its first flight from Burbank to Muroc AFB on November 9, 1946. Shortly after initial testing indicated that the type was seriously underpowered, exhibiting poor rate-of-climb and excessive takeoff runs, it was re-engined with 3,500-hp R-4360-22Ws having water methanol injection. With six JATO rockets installed, takeoff runs at gross weight were reduced by a factor of 28 percent. On a proving flight in mid-1948, the XR6O-1 made a nonstop flight of 2,460 miles from NAS Moffett Field, California to NAS Patuxent River, Maryland. The second *Constitution*, completed with -22W engines and an airline-type interior, was delivered to the Navy in mid-1948, then in February 1949, set the a new record for number of people carried on a nonstop flight when it flew 14 crewmembers and 74 passengers from California to Washington, D.C.

The first XR6O-1 started regular service with VR-44 out of NAS Alameda in February 1949, followed six months later by the second Constitution, and soon afterward, their designations changed to XR6V-1. Most often, VR-44 used the two big transports to make cargo and passenger runs between the West Coast and Hawaii. In actual operations, both aircraft suffered from seriously reduced range when engine overheating necessitated cruising with the cowl flaps partially open. In early 1950, both XR6Vs were pulled off regular duties to make a continental U.S. recruiting tour to 19 cities with the legend "YOUR NAVY — AIR AND SEA" painted in large letters on the fuselage sides. Citing unacceptably high operating costs, the Navy removed the Constitutions from active service in 1953 and placed them in storage at Litchfield Park, Arizona. In 1955, after being sold to different civil owners, one was flown to Las Vegas, Nevada and the other to Opa-Locka, Florida, however, both were later scrapped when the CAA refused to issue the airworthiness certificates needed for civil operations.

**RQ, R2Q, and JQ (see Fairchild C-8 in Part A)**

**R3Q (see Stinson UC-81 in Part A)**

**R4Q (see Fairchild C-119 in Part A)**

**RR (see Ford C-4 in Part A)**

**RS (see Sikorsky C-6 in Part A)**

## **Northrop RT —1935**

### **Technical Specifications (RT-1)**

Type: Staff transport.

Manufacturer: Northrop Corp. (Subsidiary of Douglas Aircraft Co.), Inglewood, California.

Total military versions: 1 (USCG).

Capacity: One pilot plus seven passengers.

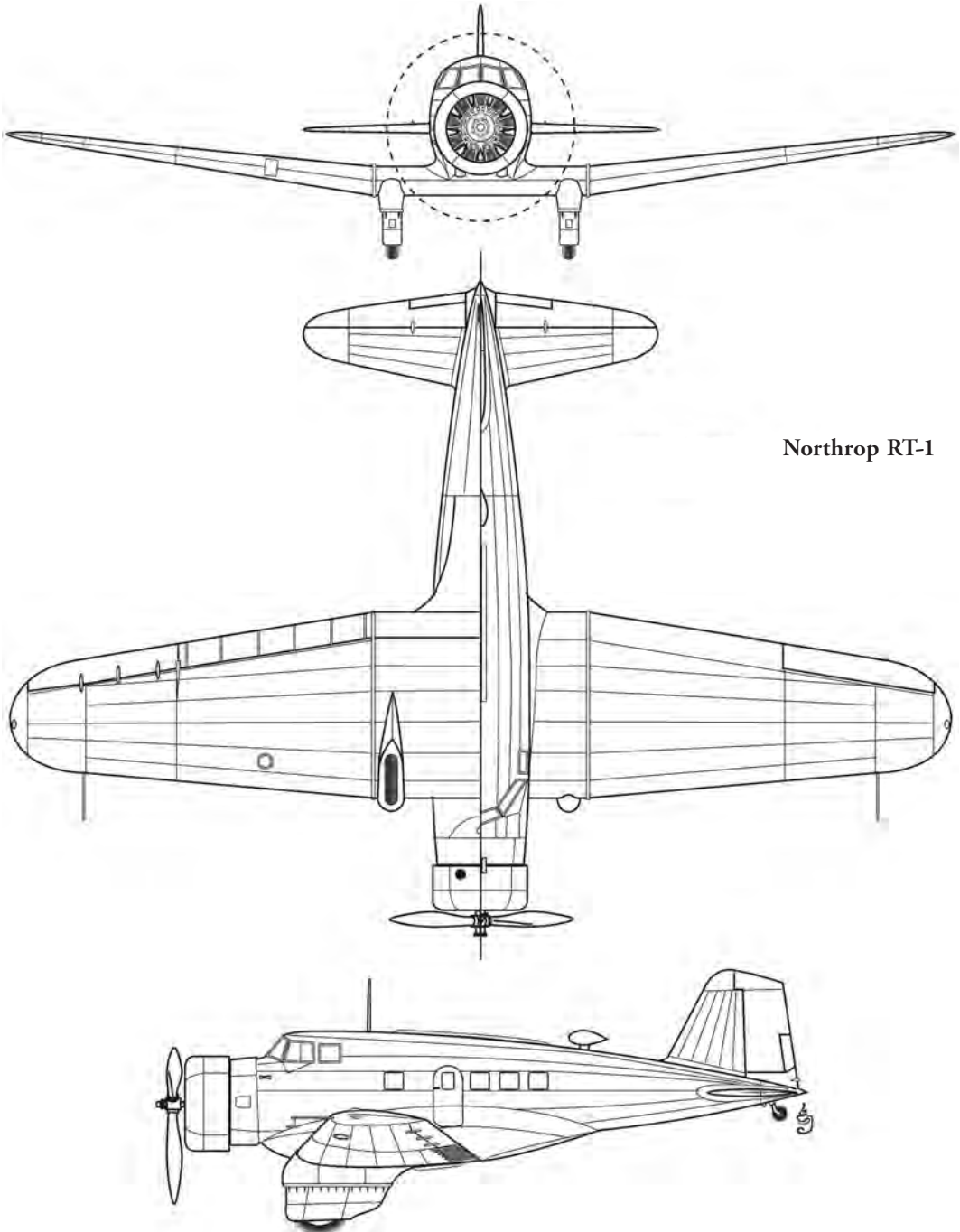
Powerplant: One 735-hp Wright R-1820-F52 *Cyclone* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard variable-pitch metal propeller.

Performance: Max. speed 219-mph at 6,300 ft.; ceiling 20,000 ft.; range 1,650 miles.

Weights: 4,540 lbs. empty, 7,350 lbs. gross.

Dimensions: Span 47 ft. 9 in., length 33 ft. 3 in., wing area 363 sq. ft.

A single Northrop Delta 1-D executive transport was procured for the Coast Guard in February 1935 and taken into service as the RT-1. It was an exceptionally clean low-wing monoplane utilizing Northrop's very advanced multi-cellular wing design and all-metal, stressed skin construction. Other noteworthy features included a fixed landing gear encased in streamlined spats and split landing flaps. After introducing the very sleek Delta in 1933, Northrop's plans to market it as a small airliner were effectively frustrated by a 1934 federal regulation requiring multi-engine aircraft for airliner operations at night or over rough terrain. One of the eight Delta

**Northrop RT-1**

1-Ds ultimately completed by Northrop, the RT-1 was assigned to the Coast Guard to be used as the personal staff transport of then Secretary of the Treasury, Henry N. Morgenthau, Jr. The Treasury Department ceased using the aircraft sometime during the late 1930s, after which the Coast Guard continued operating it as a fast VIP transport until it was damaged beyond economical repair in late 1940.



This Northrop Delta 1-D was placed on the Coast Guard inventory in 1935 to serve as a personal transport for the Secretary of the Treasury. Used in the late 1930s as a USCG VIP transport.

R7V (see Lockheed C-69 and -121 in Part A)

R8V and UV (see Lockheed C-130 in Part A)

RY (see Consolidated C-87 and -109 in Part A)

### Consolidated/Convair R2Y Liberator-Liner — 1944

#### Technical Specifications (XR2Y-1)

Type: Long-range logistical transport.

Manufacturer: Consolidated Aircraft Corp. (Convair in 1945), Fort Worth, Texas.

Total military versions: 1 (USN).

Capacity: Crew of four plus 48 passengers or 12,000 lbs. of cargo.

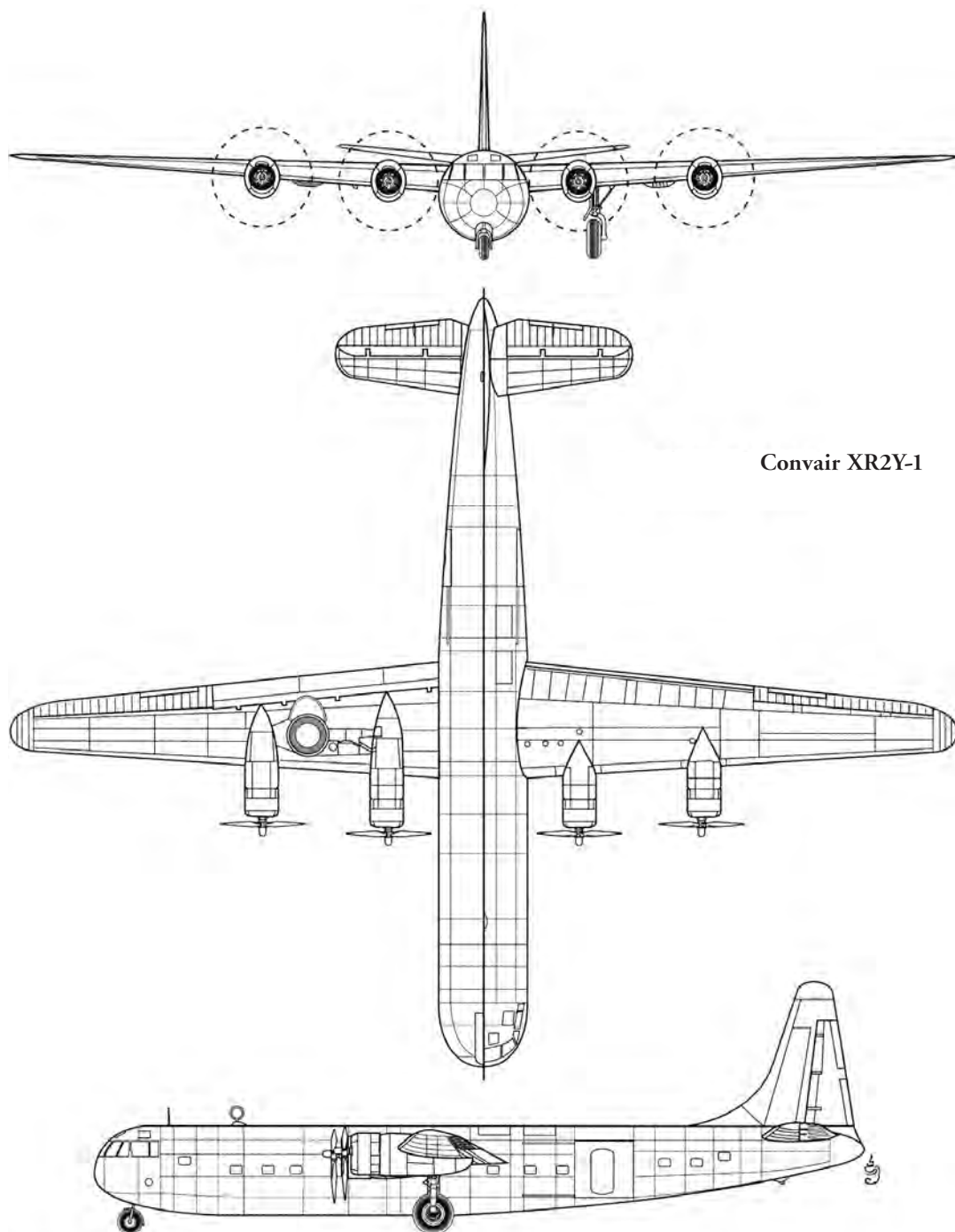
Powerplants: Four 1,200-hp Pratt & Whitney R-1830-94 *Twin Wasp* 14-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 282-mph, cruise 240-mph; ceiling 26,600 ft.; range 4,000 mi.

Weights: 35,000 lbs. empty (est.), 64,000 lbs. max. takeoff.

Dimensions: Span 110 ft., length 90 ft., wing area 1,048 sq. ft.

The Consolidated model 39 represented an ultimately unsuccessful attempt to create a new civil and military transport by combining the wings and tail group of the RY-3 (see C-87 and -109 in Part A, above) with a new circular section fuselage designed to accommodate either 48 passengers or 18,500 lbs. of freight. After reviewing the model 39 proposal in early 1944, BuAer agreed to evaluate a prototype under the designation XR2Y-1, with a letter of intent to order



**Convair XR2Y-1**





**The sole XR2Y-1 prototype shown in 1944. Despite its military markings, the aircraft flew under civil registration (NX30039) and never received a bureau number.**

253 production aircraft but canceled the option before the prototype flew on April 15, 1944. Though initially tested in military markings, the XR2Y-1 was never actually delivered to the Navy or assigned a Bureau Number, and under civil registration (NX30039), was loaned to American Airlines in 1945 and evaluated for several months as a cargo hauler. A second Liberator-Liner (NX3939) was completed in late 1944, however, Convair apparently decided against pursuing civil type certification and scrapped both examples sometime before the end of 1945.

## **Convair R3Y Tradewind —1954**

### **Technical Specifications (R3Y-1)**

Type: Troop and logistical flying boat transport.

Manufacturer: Convair Div. of General Dynamics Corp., San Diego, California.

Total military versions: 11 (USN).

Capacity: Crew of five plus 103 troops or 47,951 lbs. of cargo.

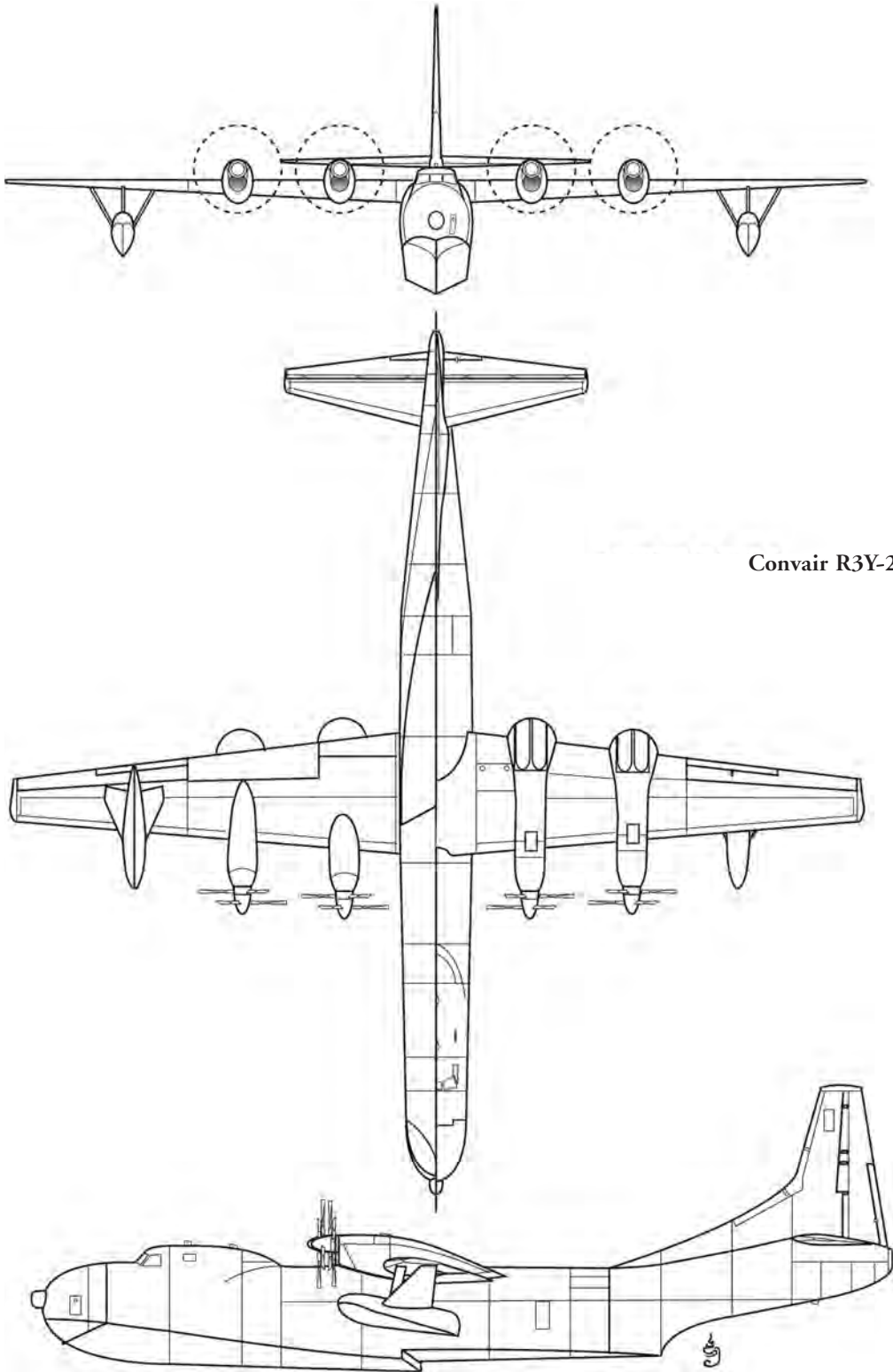
Powerplants: Four 5,500-shp Allison T40A-10 paired turboprop engines driving six-bladed Aeroproducts contra-rotating, fully reversible metal propellers.

Performance: Max. speed 388-mph, cruise 300-mph; ceiling 39,700 ft.; range 3,450 mi.

Weights: 71,824 lbs. empty, 145,500 lbs. normal gross, 165,000 max. takeoff.

Dimensions: Span 145 ft. 9 in., length 139 ft. 8 in., wing area 2,102 sq. ft.

The only type of turboprop flying boat to enter service with the Navy, the design and development of the Convair Tradewind originated from a requirement issued by BuAer in 1945 calling for a long-range flying boat that would utilize turboprop propulsion and take advantage of recent advances in aerodynamic design. Antisubmarine warfare (ASW) was envisaged as the new aircraft's primary role, with a secondary emphasis on transportation of troops and supplies. In May 1946, after reviewing competing designs, the Navy awarded Convair a contract to build



**Convair R3Y-2**



**One of six R3Y-2s configured as an amphibious assault transport. The nine R3Ys were the only type of turboprop-powered flying boats to ever reach operational service with the Navy.**

two prototypes of its proposed model 117 under the designation XP5Y-1. At virtually the same time, Allison commenced a parallel program to develop the T40 powerplant, which, in order to reach the levels of power needed (i.e., 5,000-shp+), would entail mounting two T38 turboprop engines side-by-side and driving a propeller shaft through a common gearbox. The aerodynamic concept created for the XP5Y-1 was strikingly innovative: an exceptionally low-drag hull possessing a length/beam ratio of only 10:1 in combination with a high-aspect ratio wing employing a laminar-flow airfoil of very thin section. Fowler-type flaps occupying 60 percent of the wingspan would lower landing and takeoff speeds to the 100-mph range, depending on weight. Due to the thinness of the wings, stabilizing floats were placed outboard on streamlined fairings. The tail group consisted of a very tall fin and rudder and a horizontal stabilizer with slight dihedral.

Problems with the engine gearboxes delayed the first flight of the XP5Y-1 until April 18, 1950, by which time the Navy had already ordered the more conventional Martin P5M-1 into production to fulfill the patrol boat function. The following August, however, shortly after the XP5Y-1 had established a turboprop endurance record of eight hours six minutes, BuAer directed Convair to commence development of an unarmed transport version as the R3Y-1. Despite the loss of one of the XP5Y-1 prototypes in July 1953 in a non-fatal accident attributed to engine failure, work on the R3Y-1 continued without interruption. In addition to deletion of armament, major design changes involved modifying the nacelles for T-40A-10 engines, raising the aft hull to elevate the entire tailplane and removing dihedral from the horizontal stabilizer, plus adding twelve-foot cargo hatches on the port side. Other changes included pressurized accommodations for up to 103 fully equipped troops or 73 stretcher cases in an ambulance configuration. Full



**R3Y-2, dubbed “Caribbean Sea Tradewind,” seen on beaching gear while serving with VR-2 at NAS Alameda. Chronic problems with the engine gearboxes resulted in the grounding of all R3Ys in April 1958.**

cargo payload was 48,000 lbs. The first R3Y-1 completed its maiden flight on February 24, 1954, and five of the six ordered had been delivered before the end of year. During operational testing, one of the R3Y-1s set a new transcontinental seaplane record by flying coast-to-coast at an average speed of 403-mph, a record which still stands today. The last R3Y-1 became the R3Y-2 assault transport when completed in December 1954 with a shorter, more bulbous nose that hinged upward to allow loading of troops, supplies, and vehicles from a beach, and five more R3Y-2s were delivered to the Navy during 1955.

In early 1956, once operational trials had been concluded, the five R3Y-1s and six R3Y-2s entered service with VR-2 at NAS Alameda, replacing the unit’s Martin JRM Mars (see below). Two of the R3Y-2s were afterward fitted with probe and drogue in-flight refueling systems, and in September 1956, one of them set a record when it simultaneously refueled four Grumman F9F-8 aircraft. Operations, however, were plagued by serious problems with the propeller gearboxes, resulting in the loss of one aircraft in May 1957 and another in January 1958. All remaining R3Y-1s and R3Y-2s were grounded in April 1958, and after being stricken in early 1959, sold for scrap.

## **R4Y (see Convair C-131 in Part A)**

### **Grumman TF (C-1) Trader —1955**

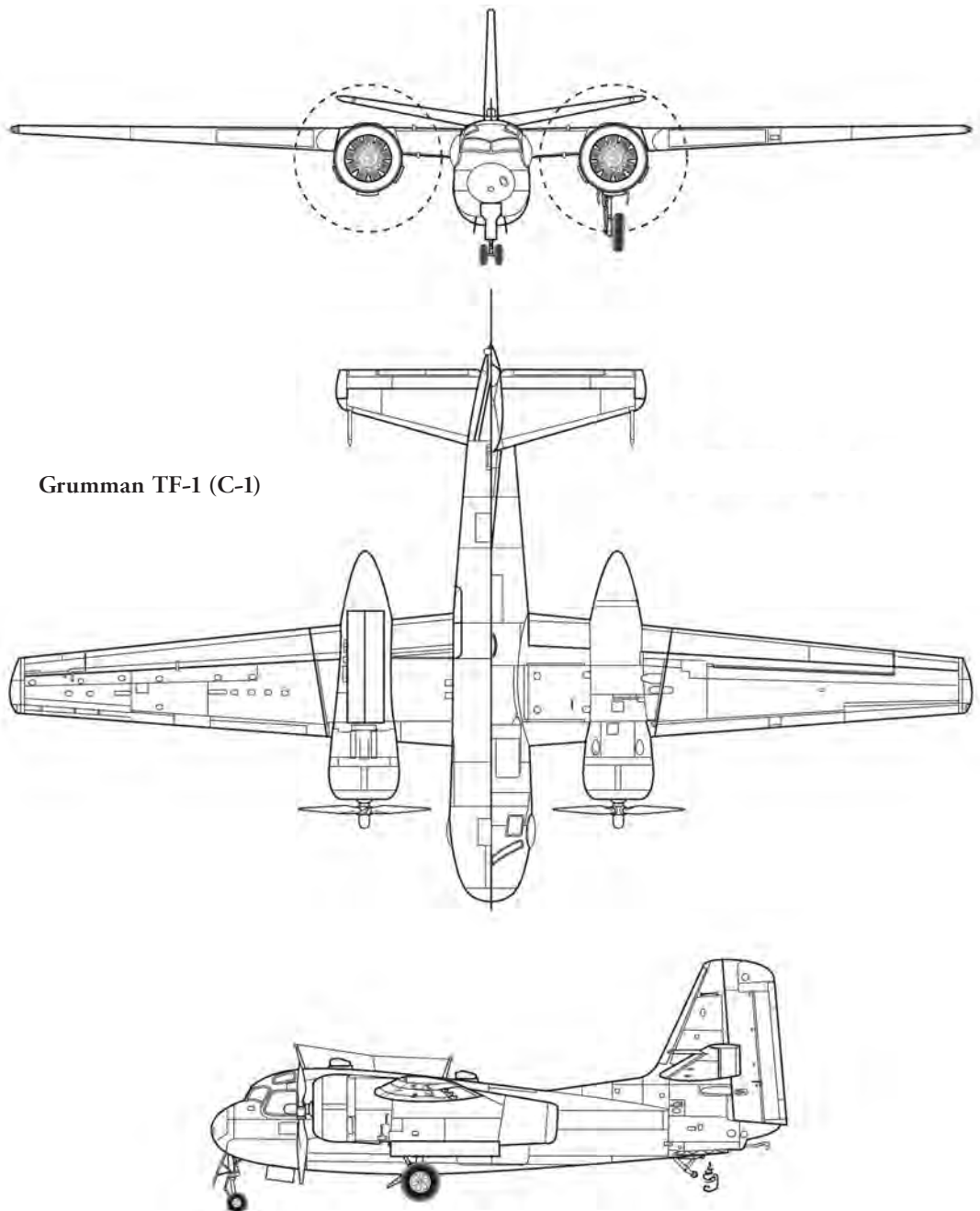
#### **Technical Specifications (TF-1/C-1A)**

Type: Carrier onboard delivery (COD) transport.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total military versions: 87 (USN).

Capacity: Crew of two plus nine passengers or 8,500 lbs. of cargo.



**Grumman TF-1 (C-1)**

Powerplants: Two 1,525-hp Wright R-1820-82WA *Cyclone* 9-cylinder air-cooled radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

Performance: Max. speed 287-mph, cruise 211-mph; ceiling 24,800 ft.; range 1,300 mi.

Weights: 18,750 lbs. empty, 29,150 lbs. max. takeoff.

Dimensions: Span 69 ft. 8 in., length 90 ft., wing area 1,048 sq. ft.

Coming as a direct offshoot of Grumman's model G-89 — flown in 1952 and subsequently placed in production as the carrier-based S2F (S-2 after 1962) Tracker ASW platform — the





**C-1A Trader seen taxiing in 1987 at NAS Willow Grove, Pennsylvania, the final year of its 33-year career. At least eight ex-Navy Traders are thought to be undergoing a rebuild for service in the Brazilian Navy.**

model G-96 was originally ordered in 1954 as a trainer variant of the S2F, hence the assigned designation TF-1, but completed as a COD transport that would replace TBM-3Rs (see below). Flown for the first time on January 19, 1955, the TF-1 Trader differed from the S2F in having a slightly deepened central fuselage to create more space under the wing spar, double cargo doors on the left side, and an interior arrangement with movable bulkheads that could rapidly be configured for up to nine passenger seats or a mix of cargo, passengers, and mail. A production contract resulted in delivery a further 87 TF-1s to the Navy during 1957 and 1958. Of this total, four specially equipped for electronic countermeasures (ECM) missions were completed as the TF-1Q. Then when the Navy adopted the tri-service designation scheme in September 1962, the TF-1 became the C-1A and the TF-1Q, the EC-1A.

As they came off Grumman's assembly line, TF-1/C-1As began entering service with Fleet Logistics Support Squadrons VR-21 and VR-23 on the West Coast and VR-24 on the East Coast, taking the place of TBM-3Rs. During the 1960s, C-1A COD operations were reorganized into three new units, VRC-30 based at NAS North Island in San Diego, California, VRC-40 at NAS Norfolk, Virginia, and VRC-50 at NAS Atsugi, Japan. Throughout the Vietnam War (1965–1972), a detachment of C-1As in VRC-50 flew out of Da Nang, South Vietnam in support of carrier operations off Yankee and Dixie Stations. Although larger, turboprop-powered Grumman C-2As (see in Part II, below) began entering service in 1966, many C-1As were destined to remain in frontline duties much longer, with the last examples being withdrawn between 1984 and 1988. A number of surplus C-1As ended up in civilian hands, and as of 2010, eight are reportedly undergoing rebuilds and upgrades for service in the Brazilian Navy.

## General Motors TBM Avenger —1950

### Technical Specifications (TBM-3R)

Type: Carrier onboard delivery (COD) transport.

Manufacturer: Eastern Aircraft Div. of General Motors, Trenton, New Jersey.

Total military versions: 40–50 est. (USN).

Capacity: One pilot plus seven passengers or 2,000 lbs. of cargo.

Powerplant: One 1,900-hp Wright R-2600-20 *Twin Cyclone* 14-cylinder air-cooled radial engines driving a three-bladed Hamilton Standard constant-speed metal propeller.

Performance: Max. speed 267-mph, cruise 211-mph; ceiling 23,400 ft.; range 1,105 mi.

Weights: 10,500 lbs. empty, 18,250 lbs. max. takeoff.

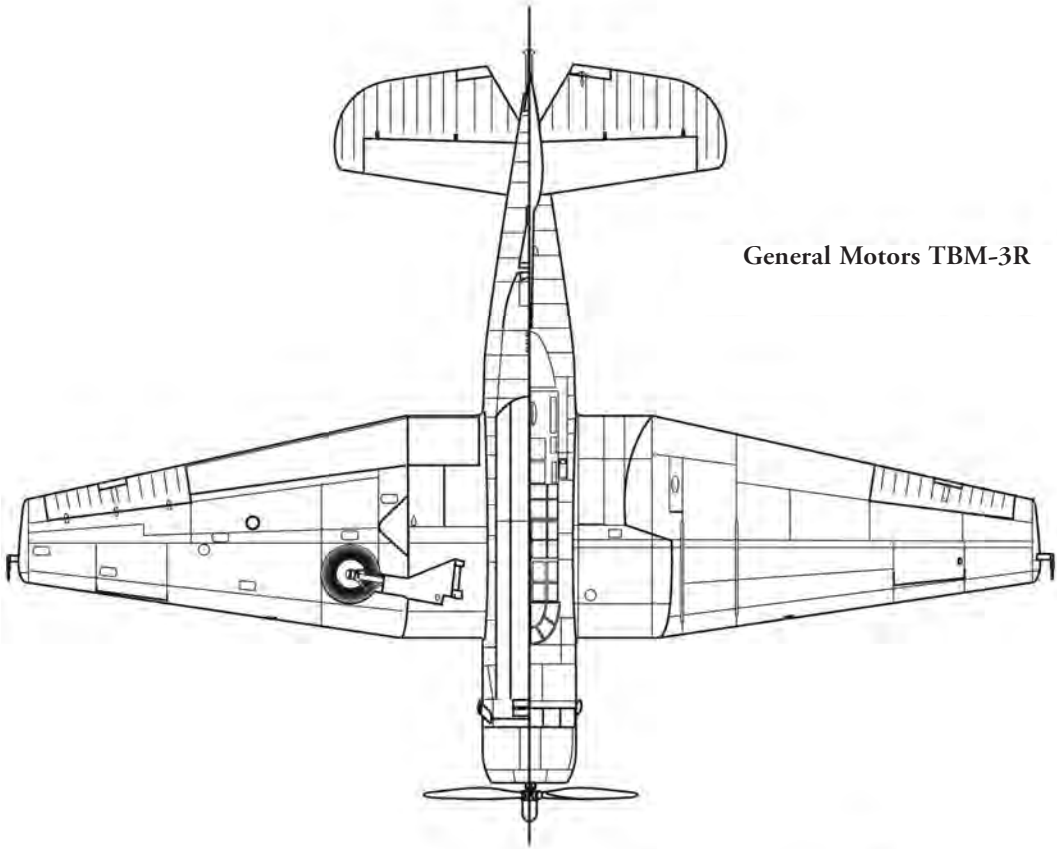
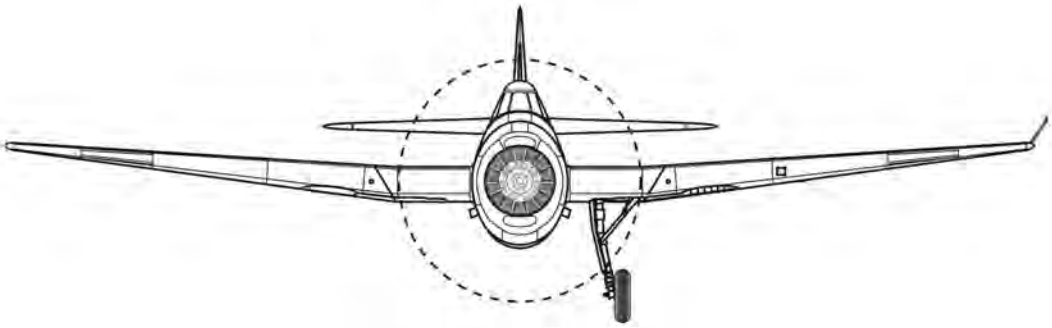
Dimensions: Span 54 ft. 2 in. length 40 ft., wing area 490 sq. ft.

The Grumman TBF, along with its license-built copy, the General Motors TBM, is universally regarded as the most important Navy and Marine torpedo-bomber design of World War II. In the postwar period, as newer types of attack aircraft arrived to replace them, many TBMs were modified for more specialized roles such as electronic countermeasures (TBM-3E), submarine hunting (TBM-3S), and early warning (TBM-3W). During the war and immediately afterward, multi-place carrier aircraft like TBMs and SB2Cs were routinely used for ship-to-shore personnel and mail delivery, but as air groups began reequipping with single-seat attack aircraft from 1946 onwards, the fleet was faced with the need for an aircraft dedicated to the task of carrier onboard delivery (COD). Thus, in 1950, a number of TBM-3s became TBM-3Rs following a conversion that entailed removing all armament and related combat equipment, reconfiguring the interior to house up to seven passengers in the cockpit and radio operator's compartment and to carry cargo or medical litters in the bomb bay, and adding a Plexiglas or metal fairing to the aft canopy where the turret had been.

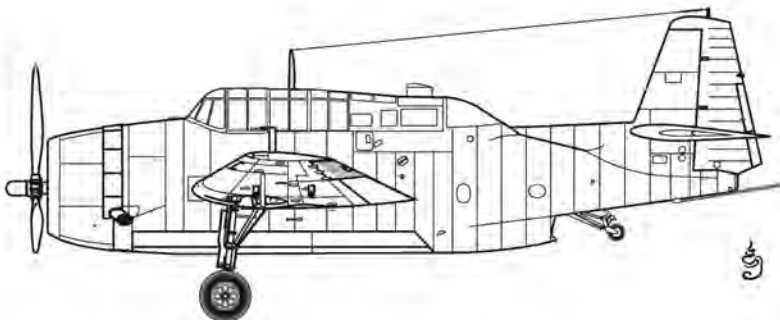
Just as soon as TBM-3Rs became available during 1950, they entered service with the



TBM-3R of VR-23 pictured over the Coast of Korea in mid-1953. With the capacity to carry seven passengers or 2,000 pound of cargo, TBM-3Rs were the first aircraft dedicated to the carrier-onboard-delivery mission.



General Motors TBM-3R



VR-21 detachment at NAS Atsugi, Japan, where they immediately began flying the first dedicated COD missions to the carriers assigned to Task Force 77 off the Korean coast. In 1951 or 1952 at least one TBM-3R is known to have been assigned to HEDRON-1 of the First Marine Air Wing in Korea. By the mid-1950s TBM-3Rs were operating with VR-21, -23, and -24, providing regular COD service to carriers in the Pacific and Atlantic Fleets. They were withdrawn in 1957 and 1958 as new TF-1s arrived to replace them.

## **Grumman UF/HU-16 (SA-16) Albatross —1947**

### **Technical Specifications (HU-16D)**

Type: Utility transport and search and rescue amphibian.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total produced: 432 (187 USN/USCG; 245 USAF), not including foreign exports.

Capacity: Crew of four plus 10 passengers or 10,500 lbs. of cargo.

Powerplants: Two 1,225-hp Wright R-1820-76 Cyclone 9-cylinder radial engines driving three-bladed Hamilton Standard constant-speed metal propellers.

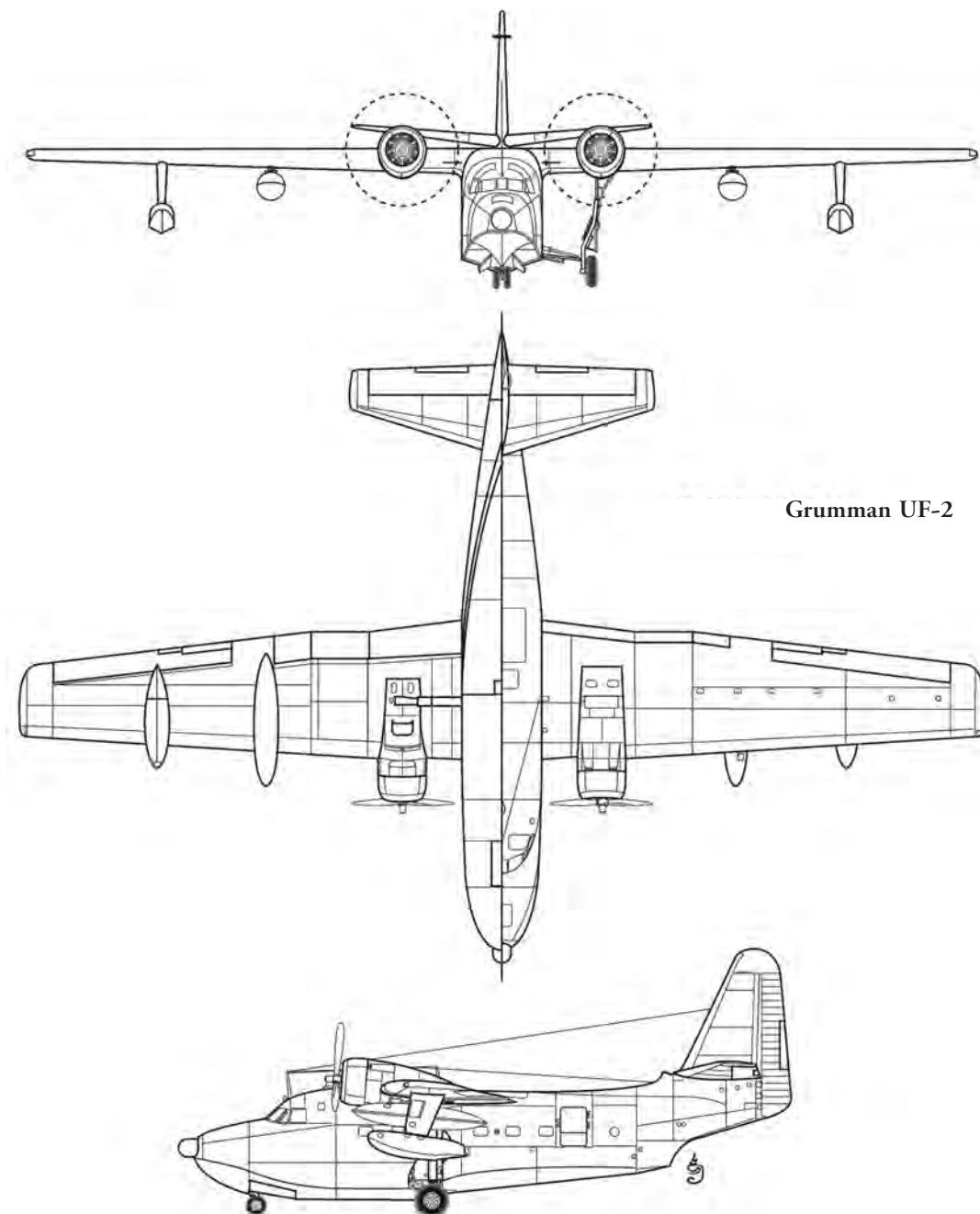
Performance: max. speed 236-mph, cruise 150-mph, ceiling 21,500 ft.; range 1,811 mi. (normal), 2,645 mi. (max.).

Weights: 22,884 lbs. empty, 32,000 lbs. max takeoff (water), 33,500 lbs. (land).

Dimensions: Span 96 ft. 8 in., length 62 ft. 2 in., wing area 1,035 sq. ft.

The design of the Grumman model G-64 arose from a 1944 Navy requirement calling for a twin-engine utility amphibian with a capacity for four crewmembers and ten passengers or 5,000 lbs. of cargo. Since extended range (2,000 mi.+) and multi-mission capability (i.e., maritime reconnaissance and antisubmarine patrol) were essential factors, the specification included provision to carry extra fuel in tip floats and for wing pylons that could be rigged to carry drop tanks, bombs, depth charges, or torpedoes. In late 1944, BuAer authorized Grumman to build two prototypes as the XJR2F-1, however, by the time construction was actually underway (delayed apparently by Grumman's other wartime production priorities), the war had ended, and the new amphibian's potential roles had been expanded to encompass search and rescue missions with the recently established U.S. Air Force. While aerodynamically similar to Grumman's earlier G-73 Mallard, the G-64 emerged with over twice the mass and horsepower. Its design featured a two-step hull incorporating a deep V-section that would permit operations in very rough seas and a durable tricycle gear arrangement comprising dual nose wheels and main gear struts that pivoted out from the wings and the hull.

The maiden flight of the first XJR2F-1 took place on October 24, 1947, and the aircraft was thereafter delivered to the Navy for official evaluations, followed shortly by the second prototype. Grumman originally selected the name Pelican for the XJR2F-1 but later changed it to Albatross. Very favorable performance trials conducted during 1947 and 1948 led to a series of production contracts from both the Navy and the USAF. In the interim, the Navy had discarded the JR designation, and G-64s were initially ordered as PF-1As, but before any aircraft could actually be delivered, the designation had changed again to UF-1 under a new utility category. From 1948 to 1954, 138 UF-1s were manufactured under Naval Bureau Numbers, including five having dual controls that entered service as the UF-1T and eight specially equipped for search and rescue (SAR) that were allocated to the Coast Guard as the UF-1G. In addition to these, 53 G-64s originally ordered under USAF serial numbers were reassigned to the Coast Guard as the UF-1G and two more which had been converted for cold weather operations in Antarctica were transferred to the Navy as the UF-1L. As they began entering operational service during 1949, Navy UF-1s were typically assigned to Fleet Aircraft Service Squadrons (FASRON) or



Grumman UF-2

NAS Base Flights where they were mainly used as utility transports and air ambulances, and for air-sea rescue as needed. The five UF-1Ts served as trainers at NAF Annapolis, Maryland and the two UF-1Ls with VX-6 at McMurdo Station in Operation Deep Freeze I (1955–1956). Coast Guard UF-1Gs, delivered between 1951 and 1954, were dedicated to the search and rescue role and allocated among air stations on the both coasts and in the Gulf of Mexico.

One of the G-64's chief shortcomings was the inability to maintain altitude on one engine.





UF-2G (HU-14E after 1962) serving with the Coast Guard. The last operational HU-16E flight was made in March 1983. The type is reported to have operated with foreign air forces until the mid-1990s.



**A total of 305 SA-16As were accepted by the USAF between 1949 and 1953 for search and rescue duties. Ninety-four of these later underwent the conversion to SA-16B (HU-16B after 1962).**

In 1955, with the aim of reducing stall speed by about 10-mph, Grumman offered an extensive upgrade, commonly known as the “B” conversion, in which wingspan was increased sixteen feet six inches with new outer wing panels incorporating enlarged ailerons and fixed leading edge camber in place of the original slots. Other improvements included a taller fin and rudder and an aerodynamic cleanup of aerals and antennas. Starting in 1956, 33 Navy aircraft underwent the conversion and returned to service as the UF-2, while another 71 were completed for the Coast Guard as the UF-2G. In 1962, upon adoption of the Tri-Service system, all remaining Navy and Coast Guard UF variants received the following designations: UF-1 to HU-16C, UF-1L to LU-16C, UF-1T to TU-16C, UF-2 to HU-16D, and UF-2G to HU-16E. During the 1960s and 1970s, Navy HU-16Ds were assigned coastal bases such as NAS Agana, Guam, NAS Guantanamo Bay, Cuba, NAS Barbers Point, Hawaii, and NAS Pensacola, Florida, where they were used for a variety of duties including humanitarian support for U.S. Trust Territories in the Pacific. During the Vietnam War (1965–1972), UH-16Ds out of Guam were dispatched to fly SAR sorties in the Philippine Sea. The last Navy HU-16D flight took place in August 1976 when the aircraft was delivered to the Naval Aviation Museum. Due to increasing airframe times, the Coast Guard began the process of withdrawing its HU-16Es from service during the late 1970s, with the type flying its final operational mission from CGAS Cape Cod, Massachusetts on March 10, 1983.

*USAF Variants:* The USAF became the largest user of the G-64, taking delivery of 245 aircraft between 1949 and 1953. Originally, the G-64 had been ordered as the OA-16A but its designation changed to SA-16A by the time deliveries started. During 1953, 154 SA-16As, sometimes referred to as “triphibians,” received skis kits for operations on snow and ice in Arctic regions.

From 1956 to 1961, 94 USAF SA-16As went to the Grumman factory for the B conversion and reentered service as the SA-16B. After the Tri-Service scheme went into effect in September 1962, the SA-16A became the HU-16A and the SA-16B, the HU-16B.

When SA-16As first began reaching USAF service in 1949, the vast majority were assigned to the Air Rescue Service (ARS) division of the Military Air Transportation Service (MATs). In the Korean War, ARS SA-16As began flying rescue sorties in the Yellow Sea during the summer of 1950 and served throughout the conflict. In service, most SA-16As were adapted to jet-assisted takeoffs (JATO) which allowed open ocean operations in seas having waves up to eight feet, and they were also retrofitted with AN/APS-31A search radars, carried under the wings initially but later housed in a nose radome. In 1965, as American military involvement in Southeast Asia increased, HU-16Bs serving with ARS (became Aerospace Rescue and Recovery Service in 1966) commenced operations on the Tonkin Gulf, and by the end of the year, had been credited with picking up 60 downed airmen. Besides their rescue duties, HU-16Bs orbiting off the Vietnam coast were frequently used as command and control platforms to coordinate multi-aircraft rescue efforts. As more helicopters undertook the rescue role in the mid-1960s, the USAF withdrew HU-16Bs from SAR operations, however, some were diverted to act as troop and supply carriers in support of Army Special Forces operations. The last active USAF HU-16D was flown to the Air Force Museum in Dayton, Ohio for preservation in July 1973. Starting in 1955, the USAF began releasing SA-16As from active service and transferring them to ANG squadrons in California, Maryland, Rhode Island, and West Virginia. The Rhode Island and West Virginia units, organized as the 130th and 135th Air Commando Squadrons, reequipped with HU-16Bs in the mid-1960s and operated them until 1971. In addition to American military sales, Grumman exported 17 SA-16As and 57 SA-16Bs (new builds) to foreign air arms and navies between 1953 and 1961.

## SERIES II

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# 1962 to Present

C-1 (see Grumman TF in Series I, Part B)

### Grumman C-2 Greyhound—1964

#### Technical Specifications (C-2A[R])

Type: Carrier onboard delivery (COD) transport.

Manufacturer: Grumman Aircraft Engineering Corp. (Grumman Aerospace in 1969; Northrop-Grumman in 1994), Bethpage, New York.

Total military versions: 58 (USN).

Capacity: Crew of four plus 26 passengers, 12 medical litters, or 21,180 lbs. of cargo.

Powerplants: Two 4,600-shp Allison T-56-A-425 turboprop engines driving four-bladed Hamilton Standard fully feathering, reversible-pitch propellers.

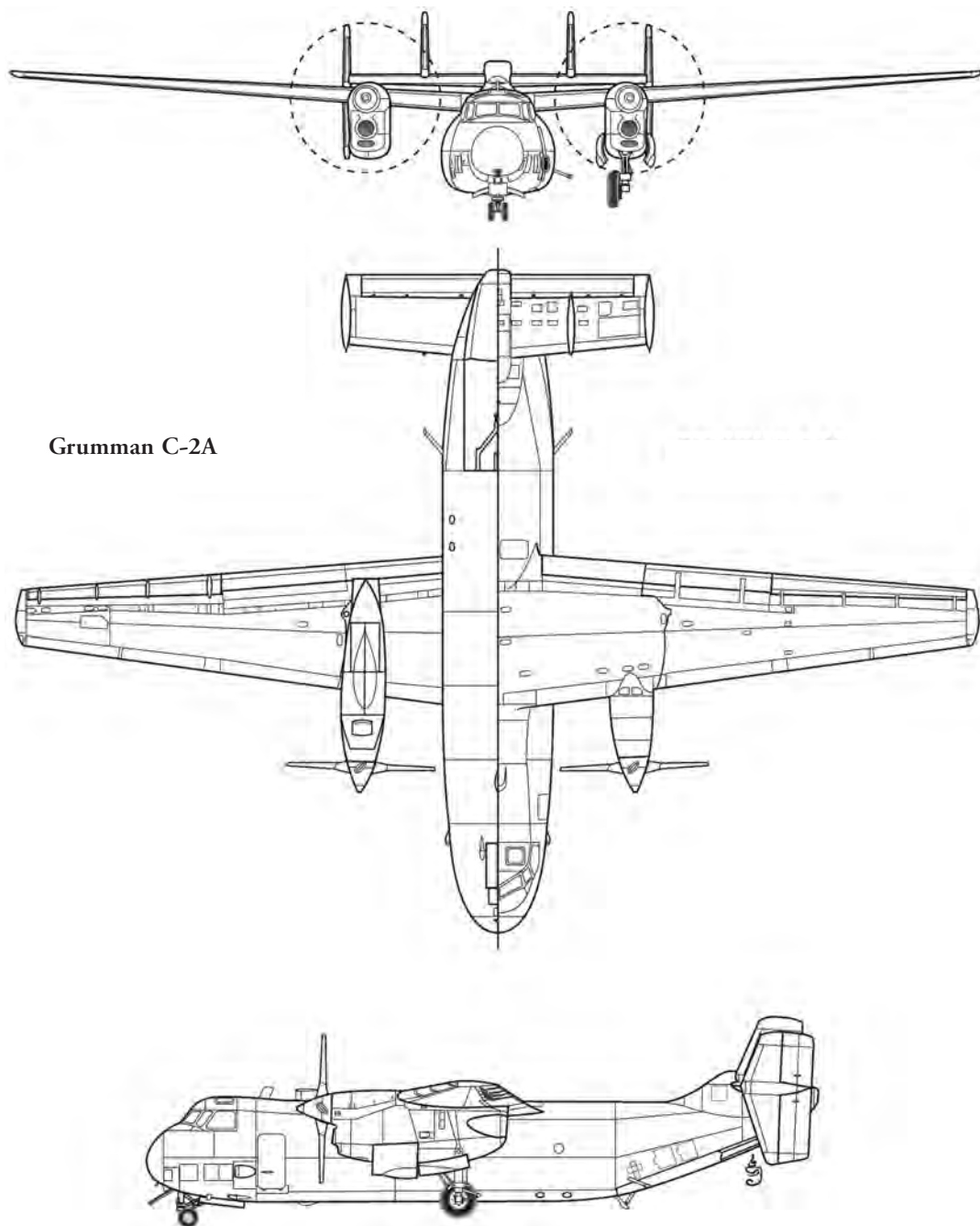
Performance: Max. speed 352-mph, cruise 296-mph; ceiling 28,800 ft.; range 1,496 mi.

Weights: 33,746 lbs. empty, 57,500 lbs. max. takeoff.

Dimensions: Span 80 ft. 7 in., length 56 ft. 10 in., wing area 700 sq. ft.

With the advent of “super carriers” (eight *Forrestal* class CVAs plus the *Enterprise* CVAN commissioned between 1955 and 1965), the Navy needed a larger-capacity type of COD transport to service these ships, and around the same time (1957–1963), Grumman had developed the much bigger, turboprop-powered E-2A Hawkeye to succeed the piston-engine E-1B Tracer in the AEW role. When Grumman proposed a COD derivative of the E-2A, the Navy ordered two flying prototypes and a single static test example under the designation C-2A. While utilizing the wings, engine nacelles, and tail group of the E-2A, the C-2A emerged with a completely new and much expanded fuselage section that incorporated a rear-loading ramp as well as more fuel capacity and strengthened nose gear to sustain higher operating weights. Dihedral was removed from the horizontal stabilizer to compensate for the absence of a dorsal rotordome. The main fuselage bay could be configured for 39 passenger seats, 20 medical litters with four attendants, or up to 10,000 lbs. of cargo (15,000 lbs. for land operations).

The first C-2A prototype, assigned the factory name Greyhound, completed its maiden flight on November 18, 1964, and following favorable acceptance trials, the Navy awarded Grumman a contract for 17 production aircraft in addition to the prototypes, with initial deliveries commencing in late 1966. The Navy’s original plan to procure a total of 37 Greyhounds was afterward limited to the 19 delivered. As built, C-2As came with 4,050-shp A-8 engines and square-tipped Aeroproducts propellers. During 1973, all C-2As underwent an extensive airframe



**Grumman C-2A**

overhaul known as the service life extension program (SLEP), and in 1974, due to evidence of fatigue, were retrofitted with round-tipped Hamilton Standard propellers. In 1984, NAVAIR (successor to BuAer and BuWeps), gave Grumman a new contract to manufacture 39 aircraft as the C-2A(R), the R denoting “reprocured,” with deliveries being completed between 1985 and 1990. The (R)s differed from C-2As in having 4,600-shp A-425 engines, a reinforced airframe, upgraded avionics, redesigned nose gear, and a larger auxiliary power unit (APU).





C-2A seen in 1988 while serving with VR-24 out of NAS Sigonella, Sicily. At the time, the aircraft was providing COD support to the USS *Dwight D. Eisenhower* in the Mediterranean Sea.



A C-2A(R) of VRC-40 shown aboard the USS *Carl Vinson* in 2009. Note eight-bladed props retrofitted during a recent service life extension program (SLEP). The Navy plans to keep the type in service until 2027.

First production C-2As commenced operational COD service with VRC-50 in December 1966 out of NAS Atsugi, Japan, where, alongside C-1As, they supported Pacific Fleet carrier operations during the Vietnam War. By the early 1980s, after 15 years of service, seven C-2As had been lost in crashes or removed from service for other reasons, plus all C-1As were slated to be phased-out before the end of the decade. Once it became apparent that the 12 Greyhounds remaining could not fulfill the fleet's future COD needs (i.e., four new *Nimitz* class carriers commissioned or under construction by 1985 with more planned), the Navy took the unusual step of placing the type back into production. As new C-2A(R)s began to reequip Fleet Logistics Support Squadrons (VRC-30, -40, and -50), they replaced both C-1As and the original C-2As, all of the latter having been withdrawn by the end of 1987. When VCR-50 was disestablished in 1994, its Greyhounds were redistributed to VRC-30 and -40, except one assigned to VX-20 at NAS Patuxent River, Maryland. Today, the 36 C-2A(R)s remaining in service are all undergoing a SLEP that includes structural improvements to the wing center-section, NP2000 eight-bladed propellers, a digital avionics suite that incorporates a carrier inertial navigation system (CAINS II) and GPS, and other improvements. Although the Navy has explored the feasibility of replacing its Greyhound fleet with a COD version of the Bell-Boeing V-22 Osprey tilt-rotor, current plans are to keep the type in service until 2027.

### C-3 (see Martin RM in Series I, Part B)

## Grumman C-4 Gulfstream I and Academe —1961

### Technical Specifications (VC-4A)

Type: VIP and staff transport and bombardier-navigator trainer.

Manufacturer: Grumman Aircraft Engineering Corp., Bethpage, New York.

Total military versions: 12 (11 USN, USCG; 1 Army).

Capacity: Crew of two plus 14 passengers.

Powerplants: Two 2,190-shp Rolls-Royce *Dart* 529-8X turboprop engines driving four-bladed Dowty Rotol fully feathering, reversible-pitch propellers.

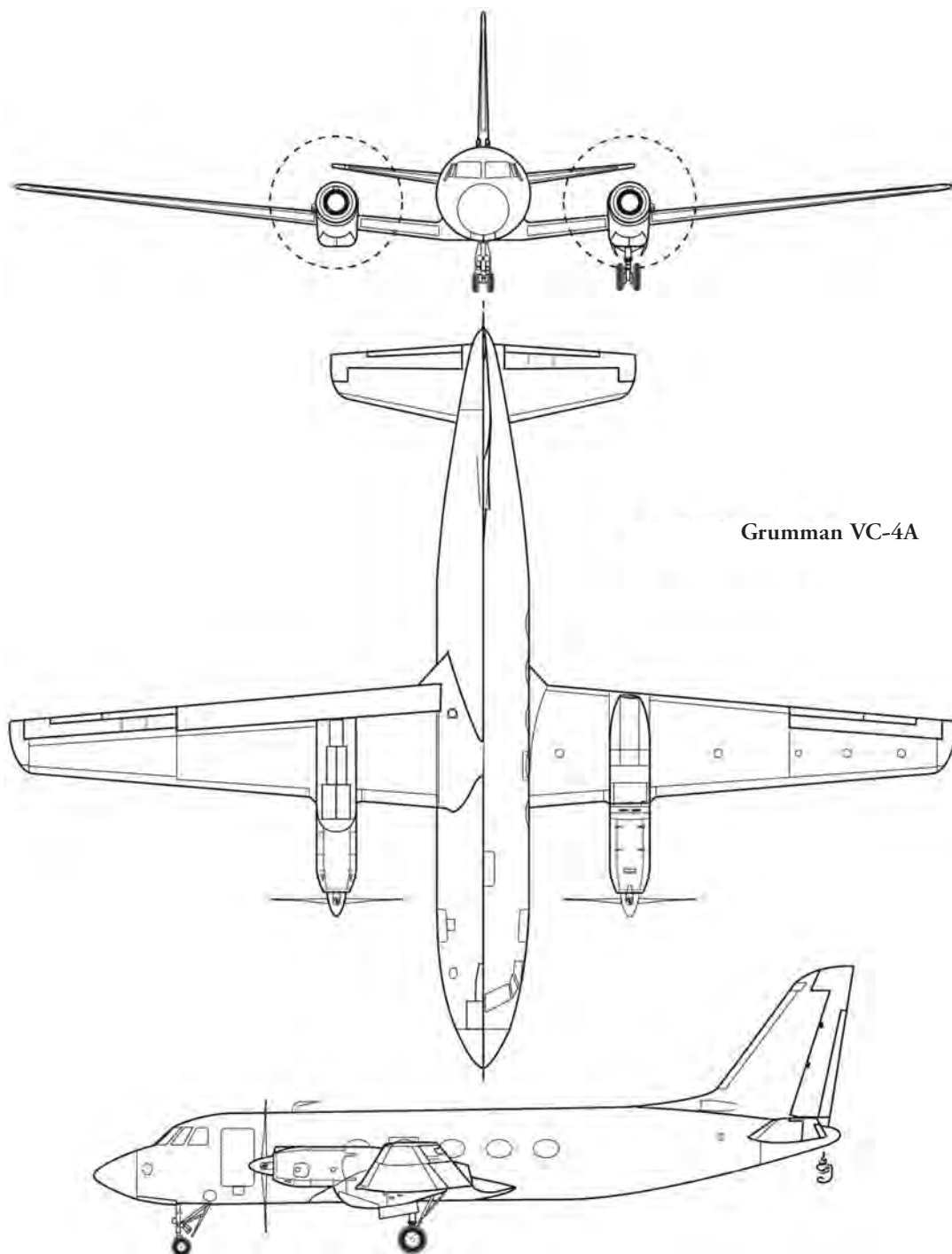
Performance: Max. speed 348-mph, cruise 288-mph; ceiling 26,000 ft.; range 2,540 mi.

Weights: 21,900 lbs. empty, 35,100 lbs. max. takeoff.

Dimensions: Span 78 ft. 4 in., length 64 ft. 6 in., wing area 615 sq. ft.

The Grumman model G-159 Gulfstream made its debut on the civil market in 1958 as the first American-designed, turbo-powered aircraft to be offered as a long-range executive transport. Fully pressurized, it accommodated a crew of two and between 10 and 24 passengers, depending on interior configuration. The design of the G-159 appeared with an exceptionally clean low-wing layout characterized by a very thin wing airfoil section and a swept vertical fin. Over a 10-year production life, Grumman sold 189 of these aircraft to civil purchasers, mainly large corporations. The first military orders came when the Army and the Coast Guard each procured one VIP-configured Gulfstream, both of which entered service in 1963 under the designation VC-4A. Nine specially modified G-159s, designated TC-4C and named Academe, were acquired by the Navy in 1967 and 1968 for the purpose of training A-6 Intruder bombardier-navigators. The TC-4C featured a bulbous nose housing a large search and targeting radar system, a simulated A-6 cockpit in main cabin, plus an auxiliary power unit (APU) to run the additional systems.

The Army VC-4A, dedicated to the use of the Army Corps of Engineers, operated in civil markings from Andrews AFB, Maryland until withdrawn from service in 1981. Based at Wash-



**Grumman VC-4A**



**The Coast Guard's VC-4A Gulfstream I as it appeared in 1964, early in its career. This aircraft served as a personal transport for both the Secretary of Transportation and the USCG Commandant until 1983.**

ington National Airport, the Coast guard VC-4A, served as a personal transport for both the Secretary of Transportation and the USCG Commandant until 1983, when it was reassigned to secondary staff duties at CGAS Elizabeth City, New Jersey, then later still to CGAS Miami, Florida until reportedly being grounded in 2000 or 2001. A replacement VC-4A, one G-159 previously operated by NASA, has since been acquired by the Coast Guard and is currently assigned to CGAS Miami. As delivered, six TC-4Cs went into Navy service with A-6 replacement squadrons and three with a Marine attack training squadron. The last TC-4C was retired from service in 1995.

## Lockheed C-5 Galaxy—1968

### Technical Specifications (C-5B)

Type: Long-range strategic airlift transport.

Manufacturer: Lockheed (Lockheed-Martin after 1993) Aircraft Corp., Marietta, Georgia.

Total military versions: 131 (USAF).

Capacity: Crew of eight plus 343 passengers or troops or 270,000 lbs. of cargo.

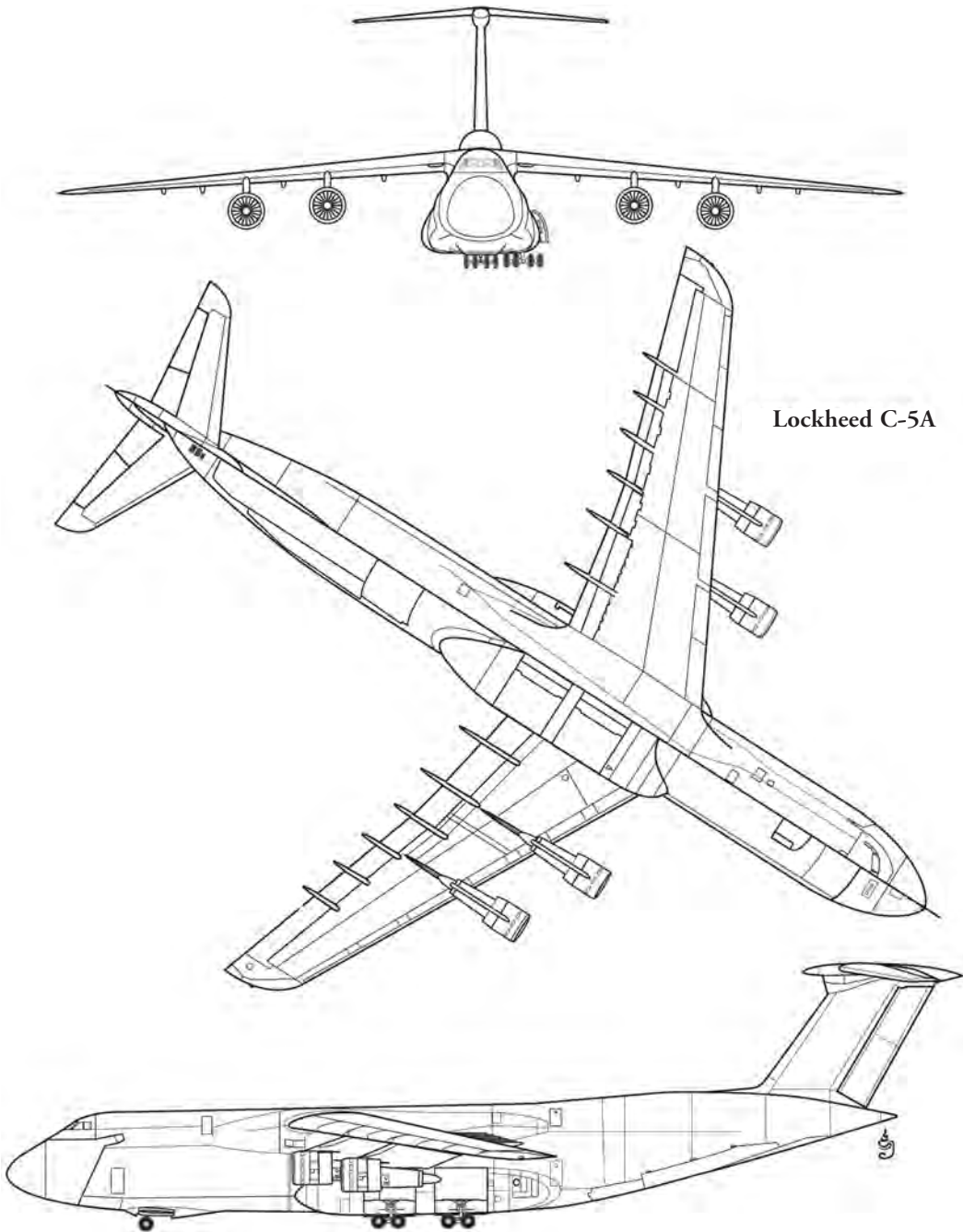
Powerplants: Four General Electric TF-39-GE-1C High-Bypass Turbofan engines, each rated at 43,000 lbs./s.t.

Performance: Max. speed 579-mph, cruise 518-mph; ceiling 35,700 ft.; range 3,430 mi.

Weights: 374,000 lbs. empty, 769,000 lbs. normal loaded, 837,000 lbs. max. takeoff.

Dimensions: Span 222 ft. 9 in., length 247 ft. 10 in., wing area 6,200 sq. ft.

The Lockheed C-5 Galaxy has been for over 40 years and for the foreseeable future will remain the most important large-capacity, strategic airlift asset in the American military inventory. Its origins can be traced to 1961, when the USAF initiated several conceptual studies with the goal of developing a pure-jet transport design that would replace existing Douglas C-133s and augment the planned fleet of Lockheed C-141s. To meet the Army's projected logistical requirements, the design dictated an aircraft of sufficient bulk and power to transport material



like outsized engineering equipment, heavy tanks, artillery, and troop-carrying helicopters. By early 1964, the studies had metamorphosed into the truly massive CX-HLS (cargo experimental-heavy logistics system), a four-engine design capable of lifting over three times the payload (i.e., 250,000 lbs.) of either the C-133 or C-141. The specification likewise mandated a range of 8,000-miles with a 125,000 lb. payload, takeoff runs of 8,000 feet and landing runs of 4,000 feet at gross weight, and an airframe life of 30,000 hours. To achieve this performance using



only four powerplants would necessitate development of new engines of unparalleled power and fuel efficiency.

In May 1964 Boeing, Douglas, General Dynamics (Convair), Lockheed, and Martin-Marietta responded with airframe design proposals and General Electric, Curtiss-Wright, and Pratt & Whitney with new engine designs. Following a review, USAF Systems Command thereafter narrowed the contest by awarding one-year study contracts to Boeing, Douglas, and Lockheed (airframe) and General Electric and Pratt & Whitney (engines). Though all three concepts shared a similar high-mounted, swept-wing layout with drive-through cargo loading via nose and rear doors, the Boeing and Douglas designs featured a raised cockpit bulge above the fuselage while Lockheed extended the flight deck forward into an egg-shaped cross-section. Other differences included conventional tail arrangements from Boeing and Douglas versus a T-tail akin to the C-141 from Lockheed. In August 1965 the USAF announced General Electric as winner of the engine contract with its 41,000 lbs./s.t. GE1/6 high-bypass turbofan (later TF-39) and a month later, Lockheed, coming in with the lowest total cost, was selected to build the airframe under the designation C-5A. Notably, much of Boeing's work on CX-HLS was later incorporated into the design of its highly successful 747 airliner.

Lockheed received a definitive contract in December 1965 and began tooling up for an expected production run of 110 aircraft. Although most of the C-5A's aerodynamic design had



MAC C-5A of the 436th Military Airlift Wing based at Dover AFB, Delaware in the mid-1970s. Due to fatigue cracks in the wings, payloads were limited to 80 percent of design capacity.



**C-5B seen in the European-1 camouflage scheme during the late 1980s. The B conversion included new wings, digital avionics, more powerful engines, and an improved flight control system. Fifty-two remain in service.**

been derived from the C-141A, its 121 foot by 19-foot main cargo bay (height 9 ft. 6 in. forward and 13 ft. 6 in. aft) possessed over five times the usable volume to handle outsized loads and could also be configured with an aft upper deck to carry up to 365 fully equipped troops. Construction of the initial batch of C-5As proceeded over the next two and a half years, with the flight of the first example (ser. no. 66-8303) taking place on June 30, 1968. In the interim, however, the program ran into difficulties stemming from serious cost overruns (in excess of one billion dollars — a record at the time) and technical design changes which ultimately caused the contract to be reduced by 29 aircraft. USAF acceptance testing began in December 1969 and the last of 81 C-5As was delivered in May 1973.

But soon after the test program was underway, wing cracks appeared in the static test airframe, with the consequence that the C-5A fleet was restricted to 80 percent of maximum design loads and by 1980, continued weakening had reduced normal operating loads to 50,000 lbs. and projected airframe life to only 8,000 hours. Starting in 1978, at a cost of 1.5 billion dollars, 77 C-5As underwent a wing-replacement program to restore full payload capability and extend airframe life, with the last being completed in 1987. As part of President Reagan's new military agenda, Congress approved a USAF contract in July 1982 authorizing Lockheed to commence production of 50 new-build C-5Bs. As well as all of the C-5A structural improvements, C-5Bs

came with upgraded avionics, carbon brakes, improved automated flight control system (AFCS), and 43,000 lbs./s.t. TF-39-GE-1C engines. C-5Bs began entering USAF service during early 1986 and the last was delivered in April 1989. In order to accommodate very large satellite and space station components for NASA, two C-5As, one in 1988 and a second in 1989, were redesignated C-5C after they underwent modifications to enlarge usable volume aft of the wing, which entailed removing the rear passenger deck floor, splitting the rear cargo door, and installing a new moveable aft bulkhead.

Since the 1990s, at the behest of Air Mobility Command (AMC), the USAF has instituted two major C-5 upgrade programs. The first, an avionics modernization program (AMP) initiated in 1998, includes a global, satellite-based communication, navigation, surveillance, and air traffic management system known as GATM, together with digital flight displays (i.e., glass cockpits) and a new autopilot, with the first AMP upgrade being completed in late 2002. Coming with AMP is a reliability enhancement and re-engining program (RERP) consisting of new 52,500 lbs./s.t. General Electric CF-6-80C2 engines, pylons, auxiliary power units (APUs), plus improvements to aircraft skin, landing gear, and pressurization system. The first C-5B RERP conversion, under the new designation C-5M Super Galaxy, was completed in May 2006, with the first flight taking place June 19, 2006. The 22 percent increase in thrust and added fuel efficiency gives the C-5M a 30-percent shorter takeoff roll, a 38-percent higher initial climb rate, a 14-percent increase in maximum payload (284,000 lbs.), and longer range between refueling (+27 percent with 125,000 lbs.). In February 2008 the USAF instituted plans for a total of 52 aircraft — 49 C-5Bs, two C-5Cs, and one C-5A — to undergo AMP/RERP C-5M conversion by the end of 2016, and as of mid-2011, five C-5Ms have been completed and three are flying. The 56 C-5As remaining are at present slated only to receive the AMP upgrade.

As they rolled off Lockheed's assembly line, production C-5As inaugurated operational service in June 1970 with the 437th Airlift Wing at Charleston AFB, North Carolina, even though acceptance testing was still ongoing. The unavoidable attrition of MAC's C-133 fleet had created such a shortfall in heavy airlift capability in Southeast Asia that C-5As began flying missions in and out of South Vietnam as early as August 1970 and went on to play a significant logistical support role over the next two years. In October 1973 MAC C-5As operating from U.S. bases airlifted tanks, aircraft parts, weapons, and ammunition to re-supply beleaguered Israeli forces during the critical days of the Yom Kippur War. Back in Vietnam, during the spring of 1975, C-5As were used for the final evacuation of refugees, and tragically, one aircraft carrying orphans and attendants crashed near Saigon on April 4. Despite the structural fatigue problems cited above, C-5As maintained an above-average safety record to the extent that 77 of 81 built remained in service by the mid-1980s, which then included five active USAF units, five USAFR units, and one ANG unit.

As well as extending service life, the wing and structural improvements incorporated to the C-5A fleet between 1980 and 1987 dramatically improved the type's overall mission capability, and as the C-5Bs began arriving for duty between 1986 and 1989, the operational differences between A and B versions was so trivial that they were simply intermixed among existing Airlift Wings. During the Gulf War (1990–1991), C-5s formed the core airlift component of moving troops, equipment, and weapons into the war zone, then again in 1994, delivering relief aid to Rwanda. Fourteen C-5As had been withdrawn and placed in storage by 2005, and under current USAF plans, one C-5A will be retired for every 10 Boeing C-17s (see below) ordered. At the date of this writing, there are 108 C-5As and Bs operating with the following active, reserve, and ANG units: 60th and 349th Air Mobility Wings (active), Travis AFB, California; 97th Air Mobility Wing (active-training), Altus AFB, Oklahoma; 105th Airlift Wing (ANG), Steward ANGB, New York; 164th Airlift Wing (ANG), Memphis Int'l Airport, Tennessee; 167th Airlift

Wing (ANG), Martinsburg, West Virginia; 433rd Airlift Wing (USAFR), Lackland AFB, Texas; 436th and 512th Airlift Wings (USAFR), Dover AFB, Delaware; 439th Airlift Wing (USAFR), Westover AFRB, Massachusetts; and 445th Airlift Wing (USAFR), Wright-Patterson AFB, Ohio. Additionally, the USAF is currently operating the two C-5Cs in support of NASA.

## C-6 (see Beech U-21 in Series III)

### De Havilland C-7 (AC-1 and CV-2) Caribou —1958

#### Technical Specifications (C-7B)

Type: Light tactical transport.

Manufacturer: De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada.

Total military versions: 164 (144 USAF; 20 U.S. Army).

Capacity: Crew of three plus 32 troops, 14 medical litters, or 8,000 lbs. of cargo.

Powerplants: Two 1,450-hp Pratt & Whitney R-2000-7M2 Twin Wasp 14-cylinder radial engines driving three-bladed Hamilton Standard constant-speed, reversible-pitch propellers.

Performance: Max. speed 205-mph, cruise 170-mph; ceiling 24,800 ft.; range 1,280 mi.

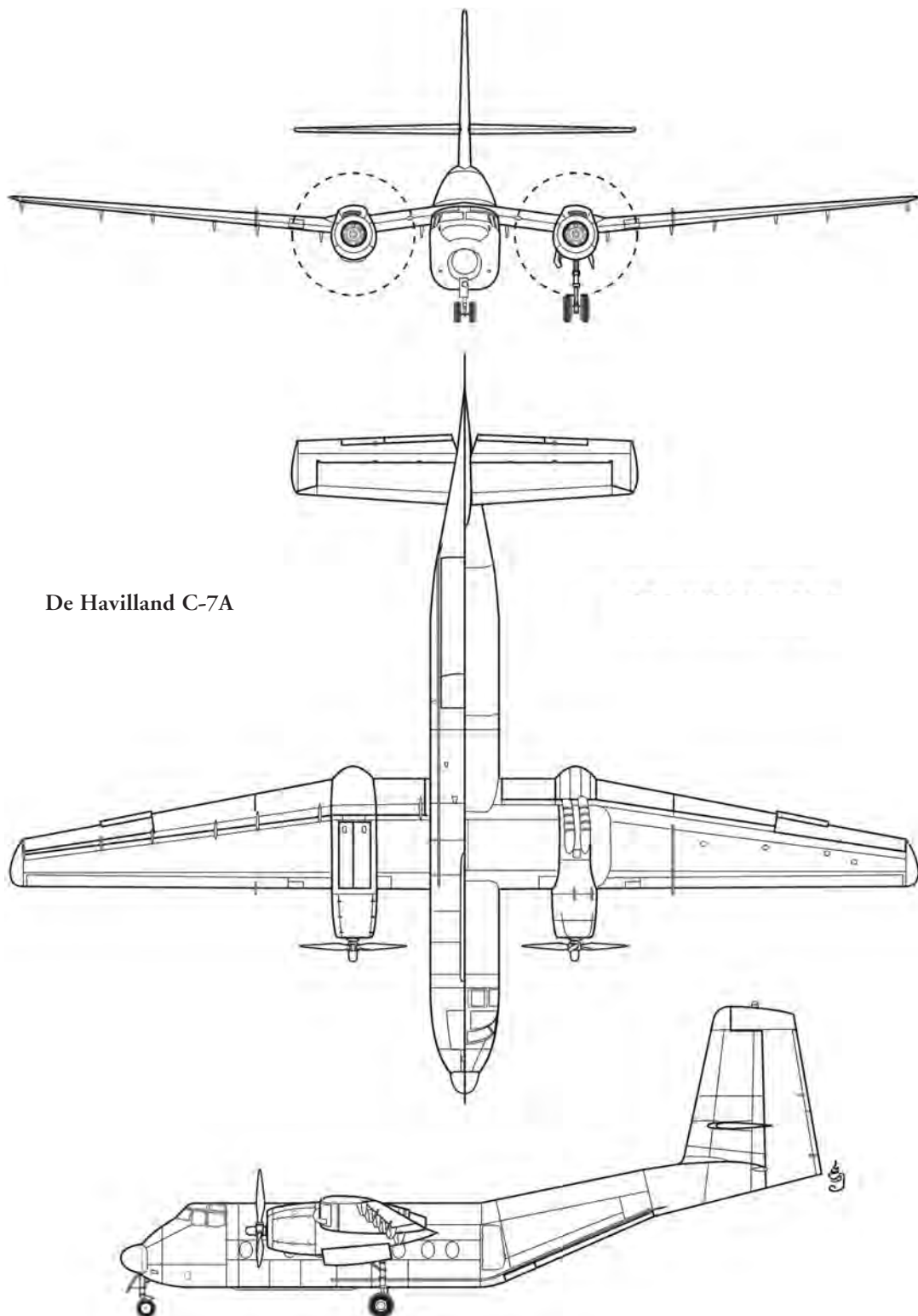
Weights: 16,920 lbs. empty, 28,500 lbs. max. takeoff.

Dimensions: Span 95 ft. 7 in., length 72 ft. 7 in., wing area 912 sq. ft.

Given its postwar success as a supplier of rugged, short-landing and takeoff (STOL) aircraft to the U.S. Army (see U-6 [L-20] and U-1 in Series III), De Havilland Aircraft of Canada (DHC) embarked upon a venture in 1955 to develop the DHC-4, a much larger, twin-engine STOL design that could function as a true tactical transport in forward battle areas, and even



One of the five pre-production YAC-1s which were delivered to the U.S. Army in 1959. The Army received approval to procure the type in quantity over USAF objections.



De Havilland C-7A





**USAF C-7A in Vietnam-era camouflage, probably in 1967. Despite the change from Army to USAF ownership, the aircraft continued their prime mission of resupplying Army and Special Forces fire bases.**

before a prototype could be built and flown, the Army ordered five pre-production models under the designation YAC-1. The design emerged with a high-wing, tricycle landing gear layout, characterized by an upswept rear fuselage and empennage allowing unobstructed access to body-width rear-loading doors. Its 28 ft. 9 in. × 6 ft. 2 in. × 6 ft. 3 in. cargo bay could be configured to carry either 32 fully equipped troops, 24 paratroops, 20 medical litters, or 8,000 lbs. of cargo, plus two jeeps or one vehicle up to 3-tons could be driven-on over a ramp built into the lower cargo door. The first civil DHC-4, dubbed Caribou by the factory, completed its maiden flight on July 30, 1958, and YAC-1 deliveries to the Army began in October 1959.

In early 1960, while acceptance testing was underway, the Army awarded DHC a production contract for 56 aircraft as the AC-1A, followed about a year later with an order for 103 improved versions as the AC-1B, which differed in having a nose radome housing a weather radar and a 2,500 lb. increase in maximum takeoff weight. Under the Tri-Service system adopted in September 1962, the AC-1A and AC-1B became the CV-2A and CV-2B. Procurement of the Caribou had been approved over USAF protests despite the fact it markedly exceeded the 5,000 lb. weight limit (empty) imposed on fixed-wing Army aircraft by an inter-service Memorandum of Understanding signed in 1952. However, under another inter-service accord negotiated in 1966, the Army agreed to transfer 144 CV-2As and Bs to USAF control in exchange for an end to restrictions on armed Army helicopters. Upon entering USAF service, all CV-2As and Bs, including those retained by the Army, were re-designated C-7A and C-7B, respectively. The Army was allowed to keep an inventory of approximately 20 Caribous with the understanding that they were to be used only for non-logistic special duties.

The Army began employing pre-production YAC-1s in operational roles as early as 1961, then almost as soon as production Caribous began arriving for service (CV-2As and Bs) during 1962, they were deployed to Southeast Asia to support Army operations in forward bases of South Vietnam and Laos, and by the mid-1960s, equipped the 17th, 57th, 61st, 92nd, 134th, and 135th Army Aviation Companies. The fact that CV-2s could routinely operate from unprepared airstrips inaccessible to USAF C-123 and C-130s, prompted the inter-service “turf war” which finally ended in January 1967 when the Army Caribou units were deactivated and their aircraft transferred to the newly created 535th, 536th, 537th, 457th, 458th, and 459th Troop Carrier Squadrons of the USAF. The shift to USAF control, however, did not change the Caribou’s essential mission of re-supplying Army firebases and Special Forces Outposts. In the final years of the war (1970–1973) the typical destinations of C-7A/Bs included airstrips along the borders of Laos, Cambodia, and South Vietnam in support of U.S., ARVN, and Montagnard forces. Caribous were withdrawn from active USAF units soon after the conflict ended, although the type continued in service with tactical airlift squadrons of the New Jersey and Maryland ANG until 1980. Army C-7A/Bs, used primarily as staff transports, remained active until the late 1980s.

## De Havilland C-8 (CV-7) Buffalo —1964

### Technical Specifications (C-8A)

Type: Light tactical transport.

Manufacturer: De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada.

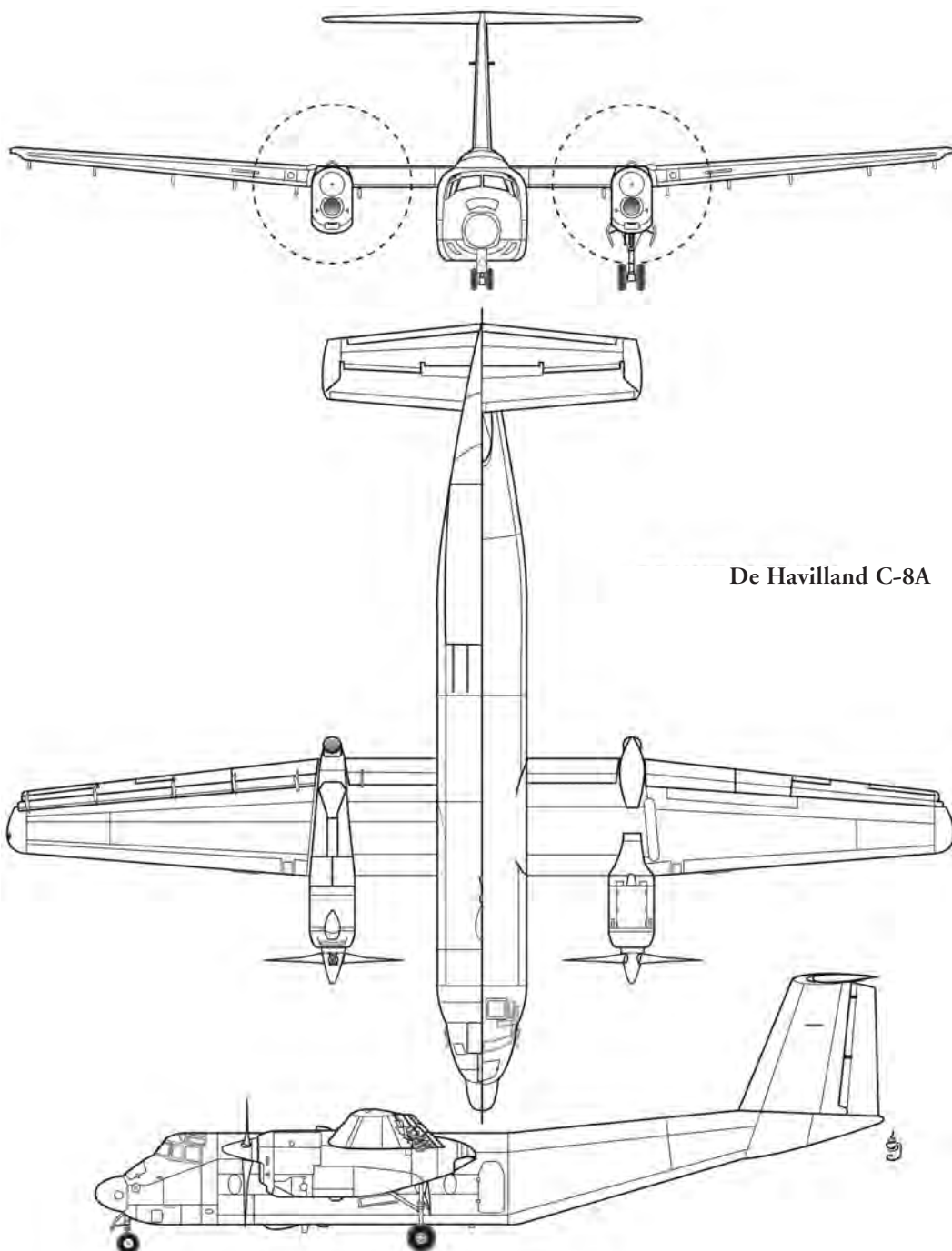
Total military versions: 4 (U.S. Army, USAF).

Capacity: Crew of three plus 41 troops, 24 medical litters, or 18,000 lbs. of cargo.

Powerplants: Two 2,850-shp General Electric T-64-GE-4 turboprop engines driving three-bladed Hamilton Standard constant-speed, reversible-pitch propellers.



YCV-7A prototype as seen shortly after its first flight in April 1964. Army plans to procure 120 were foreclosed and the four prototypes transferred to USAF control under the designation C-8A.



De Havilland C-8A

Performance: Max. speed 287-mph, cruise 253-mph; ceiling 31,000 ft.; range 530 mi.  
Weights: 22,486 lbs. empty, 41,000 lbs. max. takeoff.  
Dimensions: Span 96 ft., length 77 ft. 3 in., wing area 945 sq. ft.

In early 1962, while deliveries of AC-1/CV-2 Caribous were still in progress, Army Aviation planners solicited proposals from aircraft manufacturers for a second-generation STOL transport

having much better speed and payload. Even before this time, De Havilland Aircraft of Canada (DHC) had retrofitted the first prototype Caribou with General Electric YT-64 turboprop engines to serve as a flying demonstrator. In March 1963, after entering into a cost sharing agreement with the Canadian government, the Army selected DHC to proceed with construction of four DHC-5 prototypes under the designation YCV-7A. Though outwardly similar in design to the Caribou, the slightly larger YCV-7A Buffalo came with a T-tail to raise the stabilizer out of the engine turbulence and a redesigned wing that incorporated double-slotted flaps and spoilers to enhance STOL performance. At maximum takeoff weight, the Buffalo could be configured for 41 fully equipped troops, 24 medical litters, or six tons of cargo.

The flight of the first YCV-7A prototype took place on April 9, 1964, and all four had been delivered to the Army within a year. In late 1965, following combat testing of two of the prototypes in Vietnam, the Army proposed procurement of 120 Buffalos; however, the inter-service agreement concluded with the USAF in April 1966 effectively ended any future acquisition plans and also directed transfer of the four YCV-7A prototypes to the USAF. After a designation change to C-8A, the Buffalos served with USAF Systems Command until the early 1970s, after which they were turned over to U.S. government agencies. One example, assigned to NASA, was modified with split-flow turbofans to investigate jet-STOL characteristics. Between 1965 and 1985, in addition to the original prototypes, DHC also sold 15 Buffalos to the Canadian Armed Forces and another 107 to foreign nations. More recently, in 2008, Viking Air Ltd. of Victoria, British Columbia, successor to DHC, has announced potential plans to place the type back into production.

## McDonnell Douglas C-9 Nightingale/Skytrain II —1968

### Technical Specifications (C-9B)

Type: Aeromedical and strategic airlift transport.

Manufacturer: McDonnell Douglas Aircraft Corp., Long Beach, California.

Total military versions: 55 (24 USAF; 31 USN/USMC).

Capacity: Crew of four or five plus 100 passengers or 27,000 lbs. of cargo.

Powerplants: Two Pratt & Whitney JT8D-9 turbofan engines, each rated at 14,500 lbs./s.t.

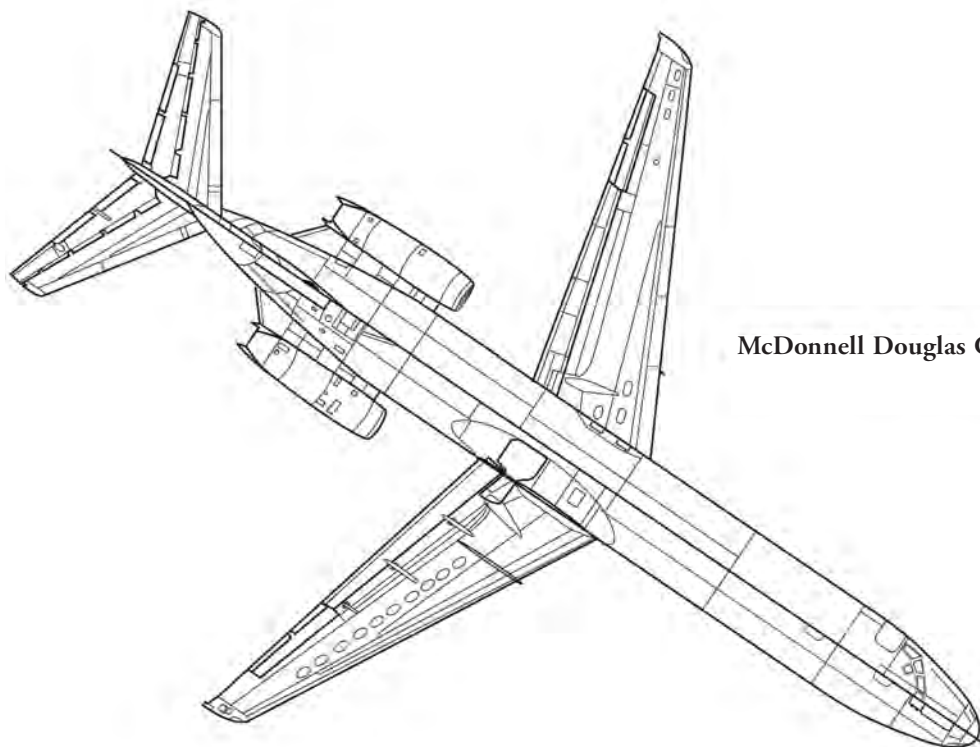
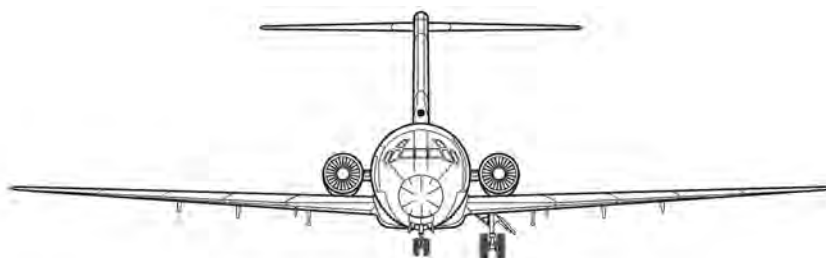
Performance: Max. speed 576-mph, cruise 504-mph; ceiling 37,000 ft.; range 2,900 mi.

Weights: 59,700 lbs. empty, 110,000 lbs. max. takeoff.

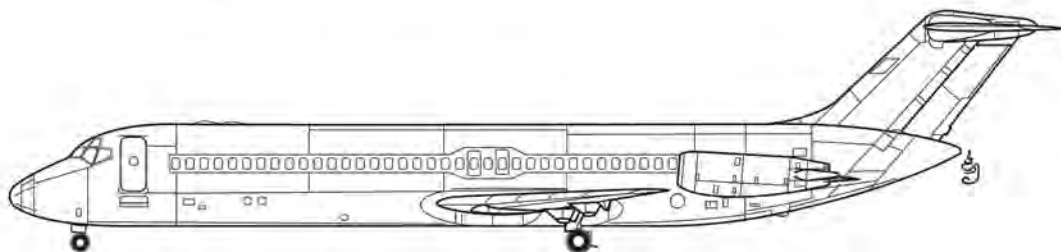
Dimensions: Span 93 ft. 5 in., length 119 ft. 3 in., wing area 1,001 sq. ft.

During the mid-1960s, the need for a medium-range, dedicated aeromedical transport to handle Vietnam War casualties led the USAF to place an order with Douglas (merged with McDonnell in 1967) for eight off-the-shelf DC-9-30 civil airliners that would be earmarked for military conversion. Changes from the basic civil layout included provision of an intensive care compartment, a cargo-type door forward of the wing on the right side with a built-in hydraulic ramp to facilitate loading of litters, and accommodations for up to 40 medical litters plus five medical attendants. The first converted aircraft, designated C-9A and named Nightingale, flew for the first time on June 17, 1968, and all eight were in operational service by the end of 1969. Successive contracts resulted in delivery of 13 more C-9As to the USAF over the next few years. Then to replace some of its older, prop-driven VIP transports, the USAF acquired three passenger configured DC-9-30s in 1976 that received the designation C-9C.

As C-9As deliveries proceeded from mid-1968 onward, they were placed into operation with the 375th Aeromedical Airlift Wing of MAC at Scott AFB, Illinois. Later, during 80s and 90s, Nightingales also served with the 55th Aeromedical Airlift Squadron out of Rhein-Main AB in Germany, the 932nd Aeromedical Airlift Group (USAFR) at Scott AFB, and the 374th



**McDonnell Douglas C-9B**







Nearly new USAF C-9A shown in 1968. Nightingales assigned to the 374th Air Wing of MAC at Yakota AFB, Japan, flew aeromedical evacuation missions out of Vietnam during the final years of the war.



Navy C-9B flying over the Golden Gate bridge during the late 1980s. This aircraft belonged to VR-62, a reserve Fleet Logistics Support unit based at NAS Jacksonville, Florida. Fifteen remain in service.

Air Wing at Yokota AFB, Japan. The phase-out of C-9As began in the mid-1990s, and the last examples were retired in 2003. All three C-9Cs entered service with the 89th Military Airlift Wing at Andrews AFB, Maryland during 1976, where they formed part of the Special Air Mission support for senior U.S. government officials and military commanders until being withdrawn in 2005.

The Navy's need to replace its aging fleet of C-131F/Gs during the early 1970s led to several contracts with McDonnell Douglas that resulted in deliveries between 1973 and 1976 of 21 DC-9-30s equipped with convertible passenger/cargo interiors which received the designation C-9B and were known as the Skytrain II. As they became operational, 19 C-9Bs were divided between Fleet Logistic Support Squadrons VR-1 at NAS Norfolk, Virginia and VR-30 at NAS Alameda, California, while the other two were assigned to Marine Squadron VMR-1 at MCAS Cherry Point, North Carolina. During the 1980s, the Navy purchased 10 ex-airline DC-9-30s also that joined the inventory as the C-9B. Currently, 15 C-9Bs remain active with the Navy but are due to be replaced with Boeing C-40s in the near future; the two Marine examples, which reportedly have lower flying times, will remain in service for the foreseeable future. One of the Navy ex-airline C-9Bs was transferred to NASA in 2003 to provide reduced gravity training for astronauts and logistical support for Space Shuttle missions.

## C-10 (reserved for Handley Page HP.137 Jetstream but not used)

### McDonnell Douglas KC-10 Extender—1980

#### Technical Specifications (KC-10A)

Type: Aerial refueling tanker and strategic airlift transport.

Manufacturer: McDonnell Douglas Aircraft Corp., Long Beach, California.

Total military versions: 60 (USAF).

Capacity: Crew of four plus 169,410 lbs. of cargo.

Powerplants: Three General Electric CF6-50C2 turbofan engines, each rated at 52,500 lbs./s.t.

Performance: Max. speed 619-mph, cruise 565-mph; ceiling 42,000 ft.; range 4,300 mi. (loaded), 11,500 mi. (ferry).

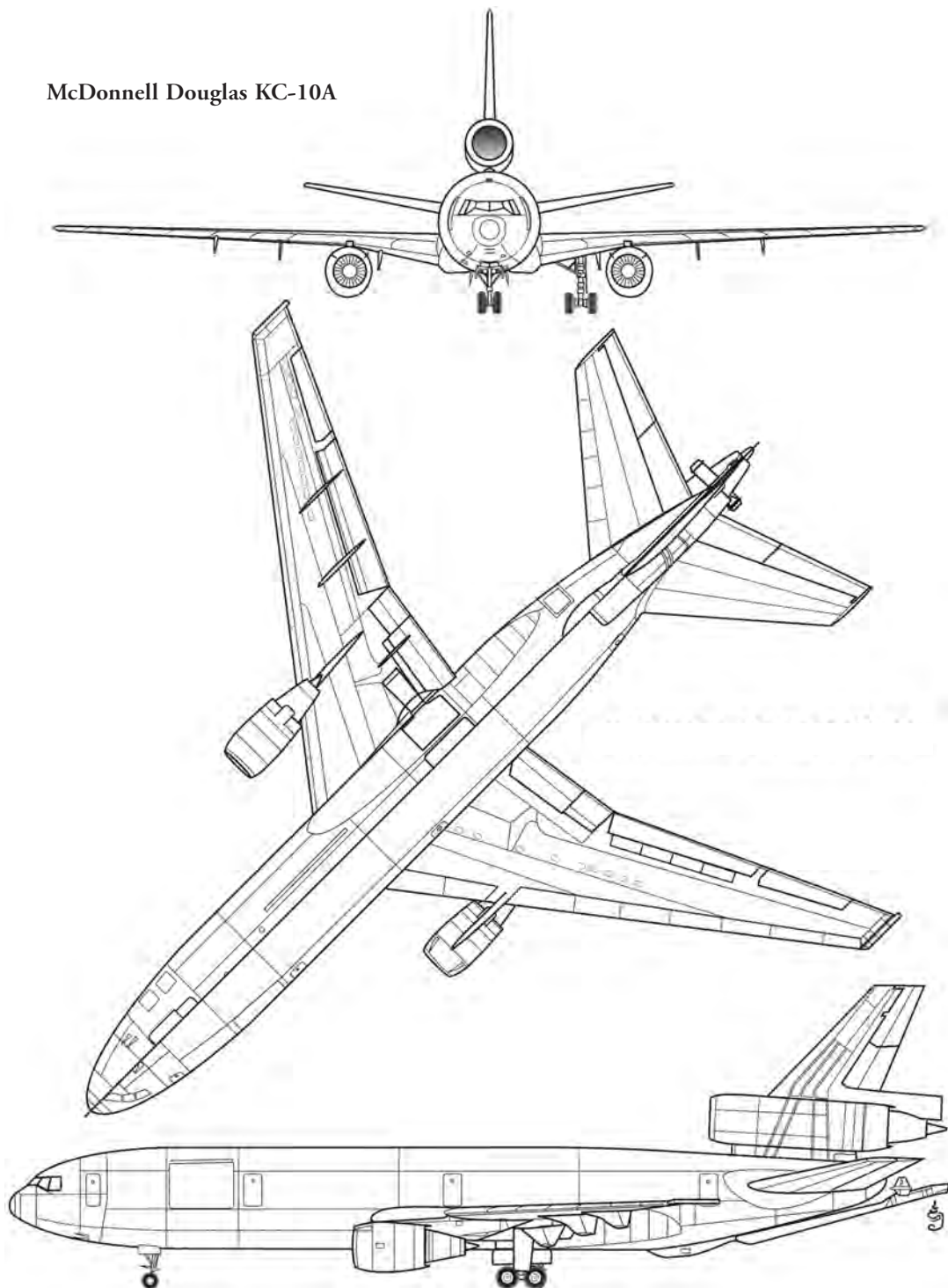
Weights: 241,027 lbs. empty, 590,000 lbs. max. takeoff.

Dimensions: Span 165 ft. 5 in., length 181 ft. 7 in., wing area 3,958 sq. ft.

Even before the Vietnam War ended, USAF planners foresaw the need for a very long-range, large-capacity aerial tanker to augment its current fleet of Boeing KC-135s. The large tanker concept was initially tested at Edwards AFB during 1972 in refueling simulations with a Douglas DC-10, and Boeing carried out similar tests with a 747. Planners also recognized that with the added volume of a wide-body aircraft, a large tanker could be adapted to carry cargo along with its fuel load. A definite program finally emerged in 1975 under the heading Advanced Tanker-Cargo Aircraft with plans to evaluate four existing designs as potential candidates: Boeing's 747, McDonnell Douglas's DC-10, and Lockheed's C-5 and L-1011. By mid-1977 the competition had narrowed to the 747 and the DC-10, then the following December, the USAF announced its selection of McDonnell Douglas based upon the demonstrated ability of the DC-10-30CF (convertible passenger/cargo version) to operate from shorter runways, and an initial production contract was awarded for 12 aircraft under the military designation KC-10A.

Even with all of the modifications incorporated, the KC-10A still shared 88 percent com-

McDonnell Douglas KC-10A





**KC-10A pictured in 1999 during the Air & Space Expo staged out of Eglin AFB, Florida, to demonstrate USAF preparedness before Members of Congress. Extenders are expected to remain in service until 2043.**

monality with civil DC-10 airframes, making it easier to obtain spares and components. Major changes involved installation of a centerline McDonnell Douglas advanced aerial refueling boom (AARB), a drogue and hose refueling system extending from the right rear fuselage, and extra fuel tanks below the main deck that raised capacity to 52,350 gallons. The main deck featured a large, upward-hinging cargo door on the left side forward of the wing and a powered roller and winch system for moving cargo. A maximum cargo payload of 169,410 lbs. on the main deck could accommodate 27 pallets or a mix of 75 passengers and 17 pallets. The maiden flight of the first KC-10A, officially named Extender, took place on July 12, 1980, and aerial refueling trials started in October. Production aircraft began entering USAF service in March 1981, and a succession of new orders brought total KC-10A deliveries to 60 aircraft by the end of 1988. The last 20 Extenders came with wing-mounted pods for added probe and drogue refueling stations. More recently, the USAF awarded Boeing (acquired McDonnell Douglas in 1997) a \$216 million contract to modernize the existing KC-10A fleet with upgraded communication, navigation, surveillance, and air traffic management systems.

As deliveries of KC-10As proceeded from 1981 onwards, they were assigned to SAC, with the 32nd Air Refueling Squadron at Barksdale AFB, Louisiana and the 22nd Air Refueling Wing at March AFB, California, then when SAC was disbanded in 1992, all were reassigned to the newly established Air Mobility Command (AMC). During the Gulf War in 1991, KC-10s played a dual role, refueling aircraft en route to and from staging bases as well as moving thousands of tons of cargo and thousands of troops for the massive military buildup. Whereas, KC-135s operated largely in an in-theater tactical role, KC-10s undertook a more strategic function, refueling large numbers of tactical aircraft on ferry flights plus transport aircraft coming and going. One mission unique to the KC-10 is the ability to move an entire tactical air unit overseas, simultaneously refueling its aircraft and carrying essential equipment and personnel. Following the

transfer to AMC, the 59 remaining Extenders (one lost in a fire in 1987) were allocated among the following Air Mobility Wings (AMW): 60th AMW (active) and 349th AMW (USAFR) at Travis, AFB, California; and 305th AMW (active) and 514th AMW (USAFR) at McGuire AFB, New Jersey. In early 1999, as part of NATO's Operation Allied Force, KC-10As completed 409 missions in support of NATO operation in Kosovo. More recently, during Operations Enduring Freedom and Iraqi Freedom, KC-10s flew in excess of 1,390 missions for U.S. and Coalition forces. Currently, the USAF plans to keep its fleet of KC-10s in service until 2043.

## Grumman/Gulfstream Aerospace C-11, C-20, and C-37 —1969

### Technical Specifications (C-20B [C-37A])

Type: Executive and operational support transport.

Manufacturer: Grumman-American Div. of Grumman Aerospace Corp., Bethpage, New York, and Savannah, Georgia; Gulfstream Aerospace Corp. (sub. of General Dynamics since 1999), Savannah, Georgia.

Total military versions: 47 (23 USAF; 12 USN/USMC; 3 USCG; 9 U.S. Army).

Capacity [C-37]: Crew of five [four] plus 12 to 14 [eight] passengers or 4,815 lbs. [6,600 lbs.] of cargo.

Powerplants: Two Rolls-Royce *Spey* Mk. 511-8 turbofan engines, each rated at 11,400 lbs./s.t. [BMW/Rolls-Royce BR710A1-10 high-bypass turbofan engines, each rated at 14,750 lbs./s.t.].

Performance: Max. speed 576-mph, cruise 508-mph [672-mph, 528-mph]; ceiling 45,000 ft. [51,000 ft.]; range 4,250 mi. [6,300 mi.].

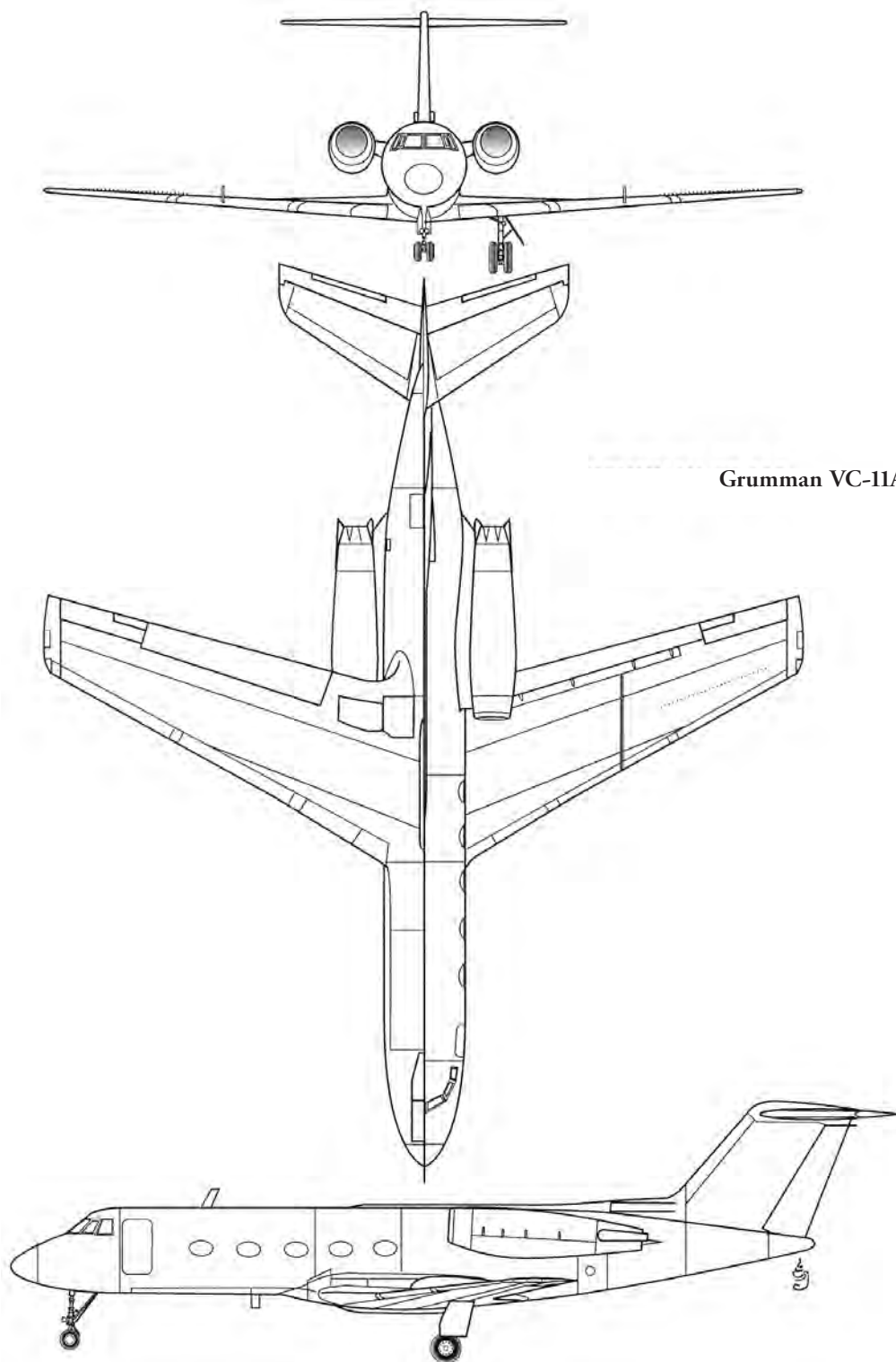
Weights: 38,000 lbs. [46,200 lbs.] empty, 69,700 lbs. [90,500 lbs.] max. takeoff.

Dimensions: Span 77 ft. 10 in. [93 ft. 6 in.], length 83 ft. 2 in. [96 ft. 5 in.], wing area 934.6 sq. ft. [1,137 sq. ft.].

Considered to be the "Cadillac" of corporate jets, every major version of the pure-jet Gulfstream series has been operated by the U.S. military branches over the past 42 years. As a successor to its turboprop Gulfstream I (see VC-4A, above), Grumman introduced the 19-passenger model G-1159 Gulfstream II (G-II) to the civil market in late 1968. In order to capitalize on the added power of its *Spey* turbofan engines in terms of speed and range, the G-II appeared as a swept-wing planform that incorporated slotted, Fowler-type flaps to provide good slow-flight characteristics and a T-tail empennage allowing greater pitch authority at higher angles-of-attack. The Coast Guard became an early customer when it purchased an off-the-shelf G-II in February 1969 under the designation VC-11A. The aircraft was thereafter based at the Washington National Airport where it functioned as the primary staff transport for the Secretary of Transportation and Commandant of the Coast Guard until being replaced in 1985. A used G-II was acquired for the use of the Army Corps of Engineers in 1981, but apparently never received an official military designation and does not appear on the current Army inventory.

Following acquisition of Grumman-American by Gulfstream Aerospace in 1980, the company introduced the G-III featuring a two-foot fuselage stretch, a six-foot increase in wingspan, plus addition of five-foot winglets. In June 1983, as a replacement for the Lockheed C-140, the USAF procured three G-IIIs under the designation C-20A, assigned initially to the 89th Airlift Wing at Andrews AFB, Maryland, as VIP transports, then later to the 86th AW at Ramstein AB, Germany, for Operational Support Airlift (OSA). Five more G-IIIs joining the USAF inventory in 1988 as the C-20B (small differences in electrical systems) went to the 89th AW at Andrews AFB for special air missions (SAM) duty. One C-20B later became the C-20C after being upgraded with special communications equipment to support presidential flights. All USAF C-20As were withdrawn from service in 2002, but the C-20Bs remain active in SAM.



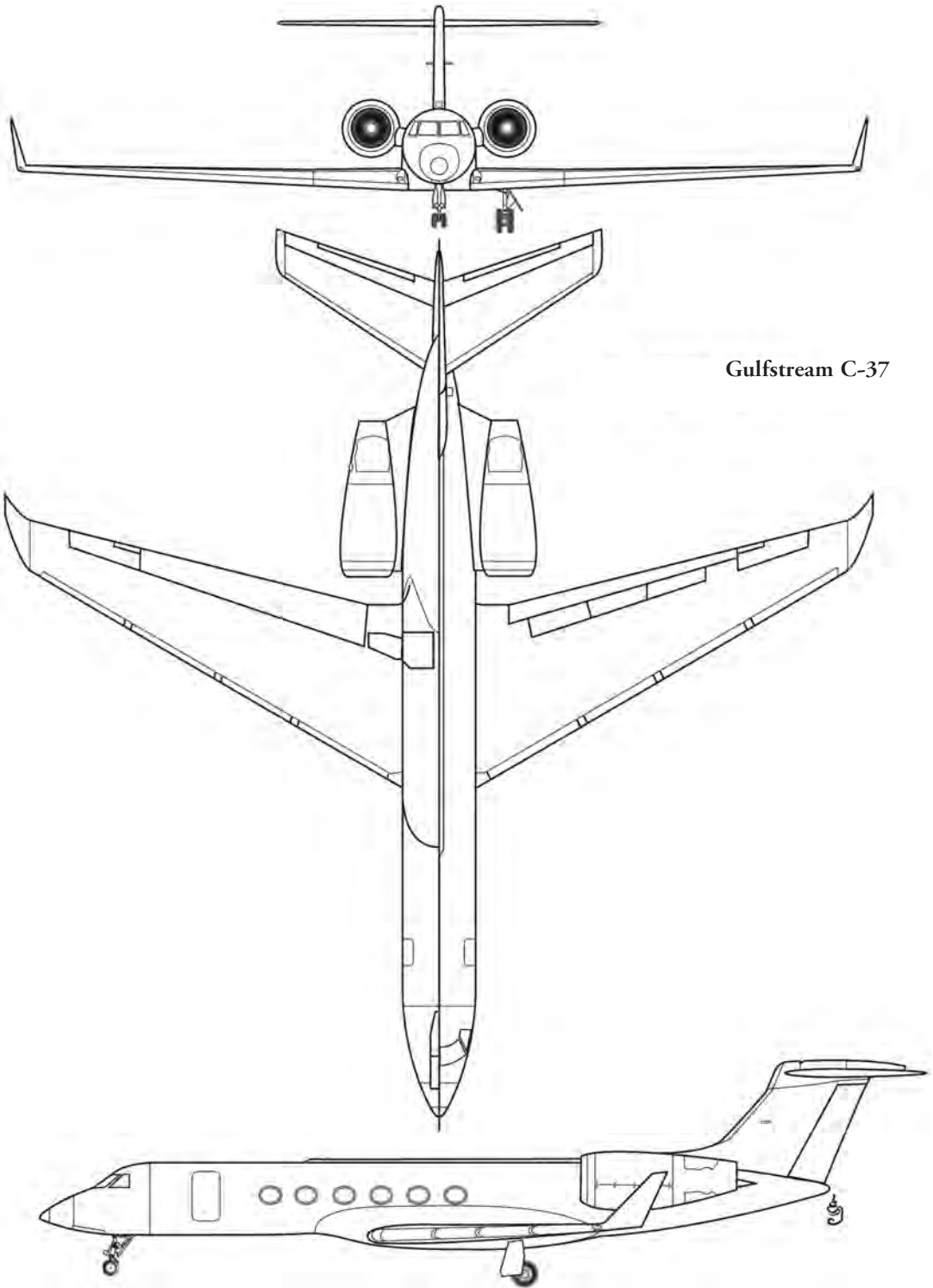




Coast Guard VC-11A seen in 1980 while on approach into Tempelhof Airport in Berlin, Germany. This aircraft was used by the Secretary of Transportation and Commandant of the Coast Guard until 1985 (courtesy Ralf Manteufel).



One of four C-20Hs procured by the USAF in 1995 and 1996. Two of these aircraft are assigned to AMC's Special Air Mission at Andrews AFB, Maryland, and the other two to Ramstein AB, Germany.



**Gulfstream C-37**



**USAF C-37A parked in Zurich, Switzerland, in 2012. This aircraft is one three C-37As serving with the 89th Air Wing out of Andrews AFB, Maryland.**

The Coast Guard acquired one G-III as a C-20B in 1985 to replace its VC-11A and operated it from the Washington National Airport until 2002. Navy procurement accounted for three G-IIIs: one in 1983, designated C-20A and assigned to the Fleet Logistic Support Wing at Sigonella, Sicily; and two in 1987, designated C-20D (new communications equipment) and assigned to the Fleet Logistics Support Wing in 1987 based at Andrews AFB. All Navy G-IIIs are still listed as active. Finally, in June 1988, the Army accepted delivery of two G-IIIs with revised seating and communications equipment under the designation C-20E. Both were subsequently assigned to the Army Priority Air Transport Detachment out of Andrews AFB and are currently in service.

Gulfstream's G-IV, flying for the first time in September 1985 and receiving FAA certification in April 1987, appeared with more powerful Tay Mk. 611-8 engines, a five-foot two-inch fuselage stretch, and avionics upgrades. During the early 1990s, as part of the Desert Storm buildup, the Army added four G-IVs fitted with executive interiors to its Priority Air Transport Detachment as the C-20F. Starting in 1994, the Navy took delivery of five G-IVs with convertible passenger/cargo interiors as the C-20G, assigning three to VR-42 based at Andrews AFB, one each to VR-51 and the Marine Corps Base at Kaneohe Bay, Hawaii. In 1995 and 1996, the USAF procured four G-IV-SP extended range versions as the C-20H, placing two on SAM duty as Andrews AFB and two at Ramstein AB as replacements for the C-20As. Although its date is unknown, the Army is reported to have acquired one G-IV-SP as the C-20J. All U.S. military G-IV variants are still listed as active.

The most recent Gulfstream versions to reach military service are the G-V and G550 (originally G-V-SP). In addition to more powerful engines, the new aircraft is larger than the G-IV overall, having an eight-foot fuselage stretch and a five-foot six-inch increase in wingspan, and

offers 30 percent longer range. Since 1998, the USAF has added nine G-Vs to its inventory as the C-37A, with four serving in the 89th AW at Andrews AFB in the SAM function, three in the 6th AMW at McDill AFB, Florida, plus one each in the 15th AW at Hickam AFB, Hawaii, and in the 86th AW at Chievres AB, Belgium. The Navy added a C-37A in 2002 which is currently attached to the Fleet Logistics Support Wing Detachment at Hickam AFB. Replacing its C-20B, the Coast Guard acquired a C-37A in 2002, based at Washington National Airport for the use of the USCG Commandant and the Secretary of Homeland Security. Two C-37As are listed on the Army inventory as of mid-2011, but date of acquisition and assignment is not available. Introduced in 2003, the G550 features aerodynamic refinements, improved range, and upgraded avionics. The USAF began taking deliveries of G550s as the C-37B in 2004, with two listed on the current inventory and one of them serving from Andrews AFB as a backup aircraft to Air Force One. Starting in 2005, the Navy procured three C-37Bs that serve as command and VIP transports out of Andrews AFB. The sole Army C-37B, based at Andrews AFB, functions today as the primary transport for the Army Chief of Staff.

## **Beech C-12 (U-21) Huron —1974**

Note: Earlier Beech King Air military derivatives based upon models 87, 90, and 100 are reported in Series III under U-21.

### **Technical Specifications (C-12A [C-12J])**

Type: Light cargo and medical evacuation transport.

Manufacturer: Beech Aircraft Corp. (sub. of Raytheon Corp. since 1993, renamed Hawker-Beech in 2007), Wichita, Kansas.

Total military versions: 365 (145 USAF; 144 U.S. Army; 76 USN).

Capacity: Crew two plus eight passengers or 2,647 lbs. of cargo.

Powerplants: Two 750-shp Pratt & Whitney PT6A-38 [1,173-shp Pratt & Whitney PT6A-65B] turboprop engines driving three-bladed [four-bladed] Hartzell constant-speed, reversible-pitch propellers.

Performance: Max. speed 299-mph [284-mph], cruise 273-mph [260-mph]; ceiling 30,900 ft. [25,000 ft.]; range 1,040 mi. [1,669 mi.].

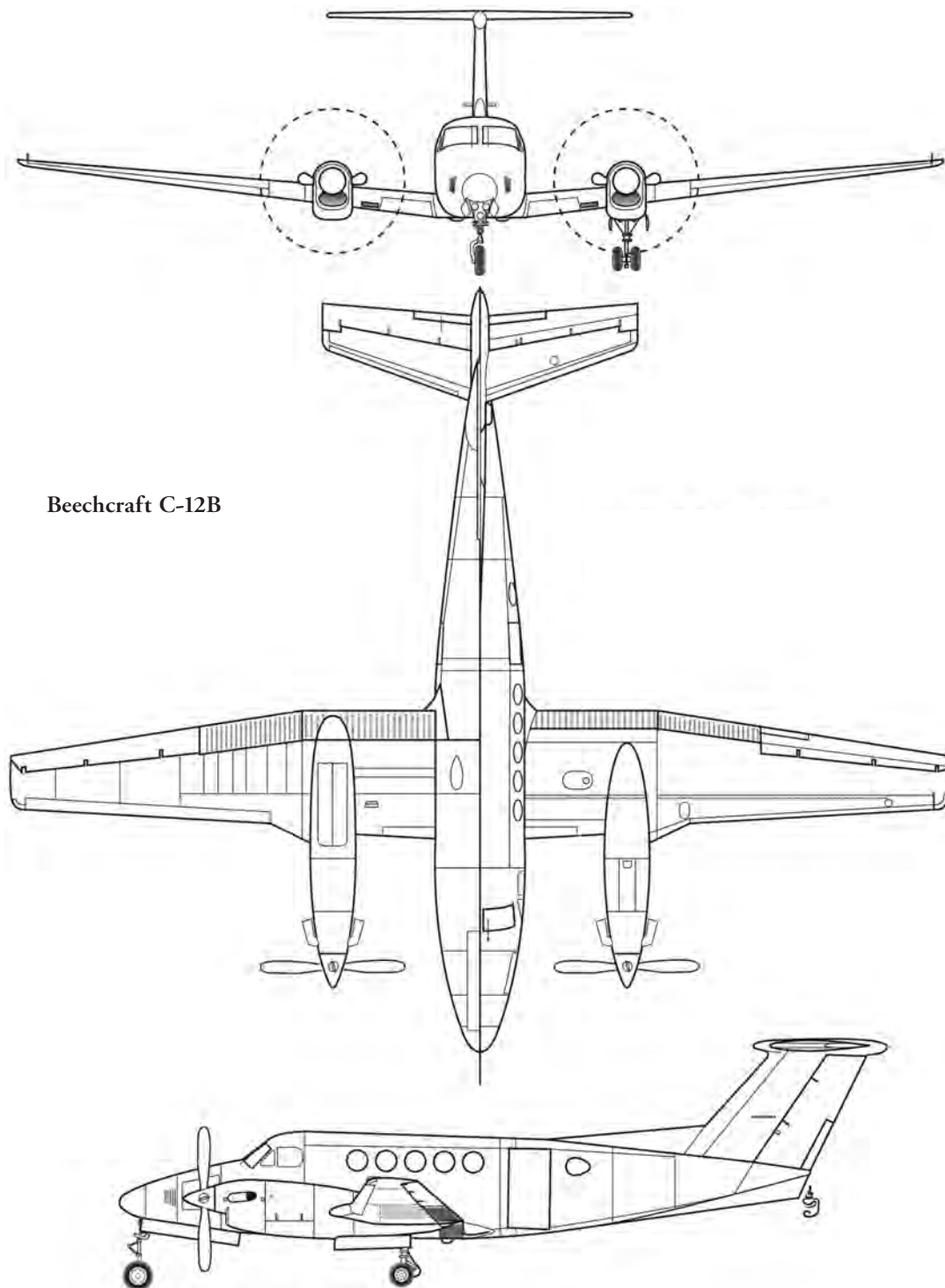
Weights: 7,334 lbs. [9,100 lbs.] empty, 12,500 lbs. [16,710 lbs.] max. takeoff.

Dimensions: Span 54 ft. 6 in., length 45 ft. 9 in. [57 ft. 10 in.], wing area 945 sq. ft.

Beech flew its model A200 (originally A100-1) Super King Air for the first time on October 27, 1972, and received FAA civil type certification in December 1973. Though aerodynamically similar to the model 90-100 series, the A200 featured more powerful engines, an extended cabin, increased wingspan, a new T-tail configuration, and upgraded avionics. As important as the added cargo and passenger capacity, the Super King Air also delivered a 20 percent improvement in ceiling and a 35 percent increase in range. But even before the prototype had flown, the Army ordered the first three Super King Air production airframes to be specially equipped for operational evaluations as airborne signals intelligence platforms (SIGINT) under the designation RU-21J, however, these aircraft, delivered in 1974, did not possess all of the refinements incorporated to the model A200 production series as a result of prototype testing. When the Army changed to a different SIGINT system in the late 1970s, the three U-21Js were fitted with VIP interiors and re-designated C-12L.

The first large military orders for the model A200 came in 1974 with an Army contract for 60 aircraft and a USAF contract for 45, both to be configured as staff and utility transports under the designation C-12A, named Huron, with initial deliveries taking place in mid-1975. Between 1978 and 1982, the Navy ordered 64 model A200s that came with 850-hp PT6A-41 engines and a left side cargo door as the UC-12B, and the USAF acquired 14 nearly identical





Beechcraft C-12B



**One of the 45 C-12Fs delivered to the USAF between 1984 and 1986 and assigned to MAC. Recent records show that two remain on the active inventory.**

examples as the C-12C. The Army began accepting delivery in 1978 of 51 new A200s which included 45 having the C model improvements, 52-gallon wingtip tanks, and high-flotation landing gear as the C-12D, plus six with minor interior differences that went to National Guard units as the UC-12D. Thirteen more C-12Ds ordered by the Army in 1983 were placed in service as the RC-12D after being equipped with wingtip sensor pods and Guardrail V SIGINT systems. Between 1984 and 1986, 64 more new A200 and B200 Super King Airs with small detail improvements went into service with military branches: 45 to the USAF and six to the Army as the U-12F and 12 to the Navy as UC-12F. Nine new C-12Fs delivered to the Army in 1988 entered service as the RC-12K after being equipped with Guardrail V SIGINT systems, at which point total C-12 military production numbered 323 aircraft.

In service many C-12s were re-designated after being upgraded or modified for special missions: Army C-12As reequipped with PT-6A-41 engines during the late 1970s became the C-12C; one Navy UC-12B became the NC-12B in 1980 or 1981 after being fitted with P-3-type sonobuoy launchers; 29 USAF C-12As were re-designated C-12E during the early 1980s after being refitted with 850-shp PT6A-42 engines; in addition to the new builds mentioned above, 20 existing Army C-12Ds became the RC-12D in 1984 after being retrofitted with Guardrail V; three Army RC-12Ds became the RC-12G in 1985 after receiving upgraded avionics and electronics; a number of Navy UC-12Bs and Fs became the UC-12M in 1988 after receiving new cockpit instrumentation; one Army C-12F became the C-12R in 1992 after being fitted with digital flight displays (i.e., "glass cockpit"); a number of older Army C-12s were re-designated



**Ordered for the Marine Corps in 2009, this MC-12W “Liberty” will apparently function as a utility transport as well as being specially equipped for airborne surveillance and reconnaissance.**

C-12T in the 1990s after receiving cockpit upgrades; and later still, C-12Ts became the C-12U after being equipped with global air traffic management systems.

Beech launched its much-modified Super King Air model 1900 in 1982 to compete in the commuter airliner market. In addition to a longer fuselage, increased wingspan, and 1,173-shp PT6A-65B engines, the 1900 boasted twice the range of previous models. Six model 1900Cs procured by the Army in 1986 that entered service as National Guard staff transports under the designation C-12J; however, all but two were transferred to the USAF in 1992 for overseas logistics duties. Continuing efforts by Beech to enhance the Super King Air series resulted in the introduction of the model 350 in 1990 which came with an extra row of passenger seats, extended span with winglets, and a 23.5 percent in power. Though no U.S. military contracts were immediately forthcoming, the USAF, in 2009, began taking delivery of the first of 37 model 350s, which will include seven ex-civil plus 30 new builds. These aircraft, designated MC-12W and re-named Liberty, are being specially equipped for ISR (intelligence, surveillance, and reconnaissance) operations in Iraq and Afghanistan. Defense sources also indicate that a UC-12W utility transport version may be on order for the Navy and Marines, however, no deliveries have been reported at this date. According to a mid-2011 report, there are still 29 active C-12 variants in the USAF (not including MC-12W deliveries pending), 88 in the Army (36 as RC-12s), and six in the Navy.

**C-13 (not assigned)**

## Boeing C-14—1976

### Technical Specifications (YC-14)

Type: STOL tactical transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 2 (USAF).

Capacity: Crew of three plus 150 troops or 81,000 lbs. of cargo.

Powerplants: Two General Electric CF6-50D turbofan engines, each rated at 51,000 lbs./s.t.

Performance: Max. speed 504-mph, cruise 449-mph; ceiling 45,000 ft.; range 3,190 mi.

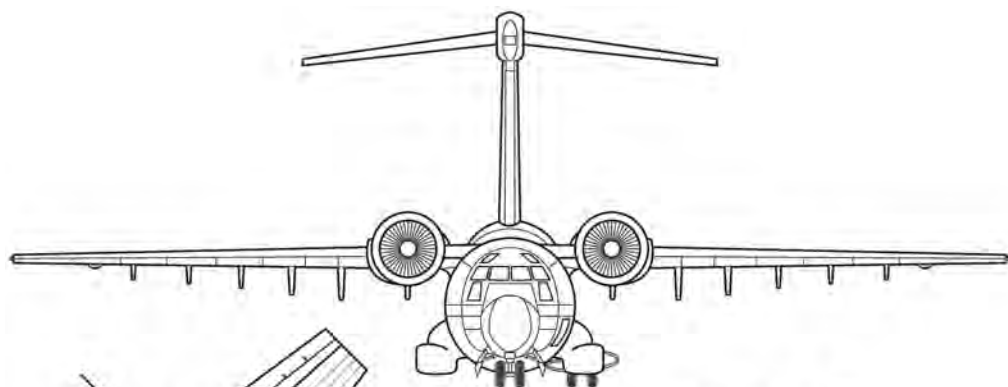
Weights: 119,050 lbs. empty; 251,000 lbs. max. takeoff.

Dimensions: Span 129 ft., length 131 ft. 8 in., wing area 1,762 sq. ft.

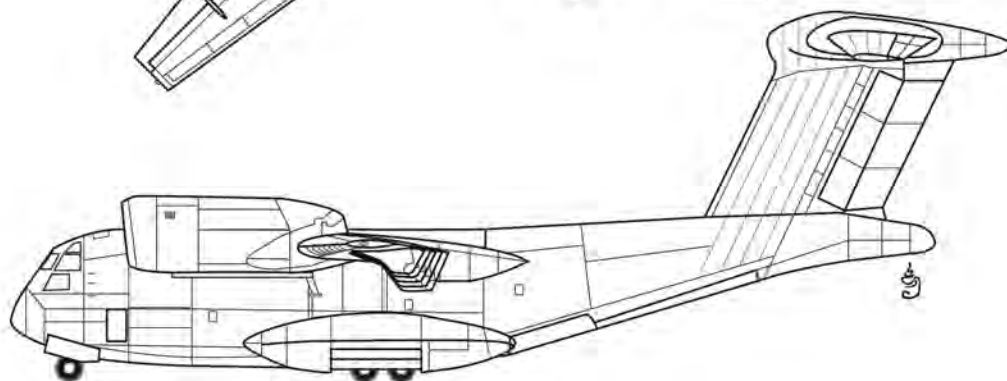
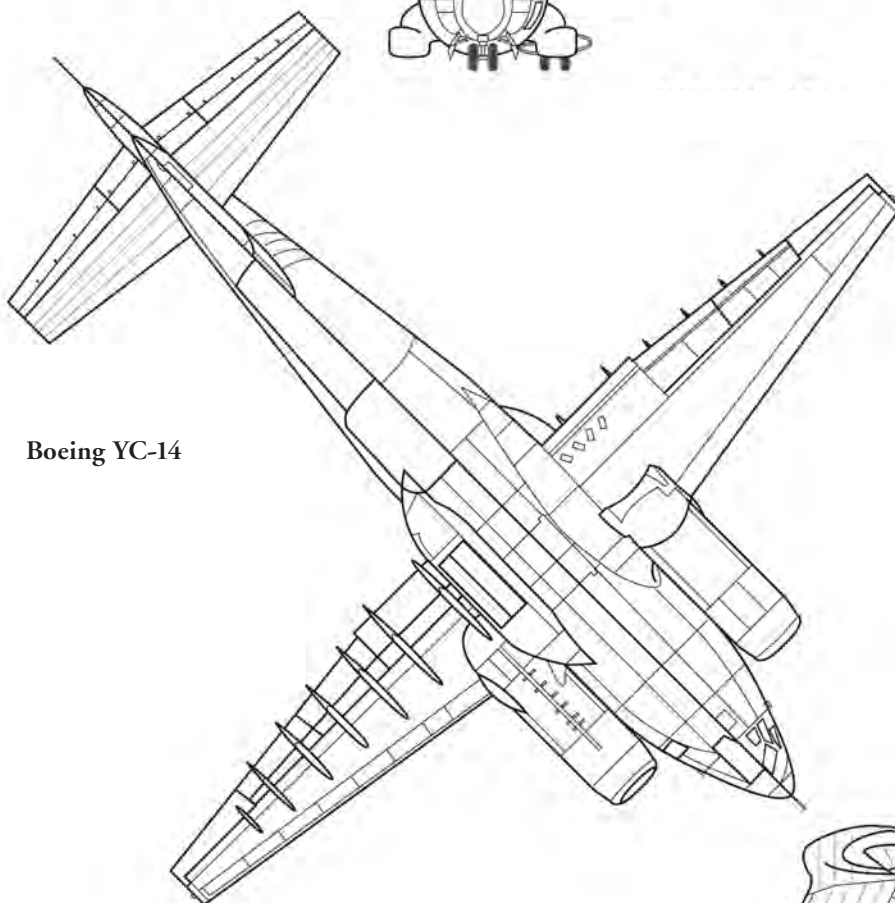
In 1968 the USAF commenced a series of paper studies to investigate the feasibility of replacing the Lockheed C-130 with some type of pure-jet tactical transport. By early 1972, under a project known as the Advanced Medium STOL Transport (AMST), the USAF was ready to solicit design proposals for a jet aircraft capable of taking off from a 2,000-foot semi-prepared field with a 27,000 lb. payload and operating over a combat radius of at least 400 miles. In November 1972, after considering design proposals from five companies, the USAF awarded development contracts to Boeing and McDonnell Douglas for two prototypes each, respectively



One of two YC-14 prototypes evaluated by the USAF as a potential successor to the C-130. Although the aircraft exceeded AMST parameters, the USAF finally decided against production in favor of the larger C-X program.



**Boeing YC-14**





the YC-14 and YC-15. Based upon experimental studies previously completed by NASA, Boeing engineers chose a YC-14 wing design that incorporated an upper-surface blowing (USB) system in which the engines were mounted to the leading edges of the wings so that the exhaust would blow over the flaps. With the flaps lowered, a phenomenon known as the Coandă effect caused the airflow generated by the USB to “stick” to the flaps in a downward trajectory. And as an added benefit, the high location of the engine intakes would help avoid ingestion of debris during rough-field operations. The YC-14’s straight wing layout, also derived from NASA studies, utilized a supercritical airfoil intended to produce high-lift at low airspeeds while reducing transonic drag at higher speeds. Other innovative features included digital cockpit flight displays that had been originally designed for Boeing’s stillborn SST program.

The first YC-14 completed its maiden flight on August 9, 1976, and competitive trials against the McDonnell Douglas YC-15 commenced at Edwards AFB the following November. Testing subsequently revealed that the YC-14 met or exceeded all of the AMST criteria, demonstrating good low-speed flight characteristics and the ability to takeoff within 1,000 feet while carrying a 27,000 lb. payload. However, by the end of 1977, before any production plans could be agreed upon, a sudden shift in military priorities placed the future of the entire AMST program on hold, and the program was officially canceled in December 1979. In the interim, under a new project termed C-X (Cargo Transport Aircraft-Experimental), military planners had determined that a strategic transport, larger than AMST but having tactical capabilities, would eventually be needed to replace the USAF’s aging fleet of Lockheed C-141s. Ultimately, in mid-1983, McDonnell Douglas was selected to develop its YC-15 into what became the much-enlarged and redesigned C-17 Globemaster III.

The YC-14 prototypes were returned to Boeing, and both survive today in Arizona, one at the Pima Air Museum and the other in AMARC storage at Davis-Monthan AFB. If imitation is the sincerest form of flattery, it can be said to have happened to the YC-14 when the very similar appearing Russian-made Antonov An-72 made its public debut in mid-1977.

## McDonnell Douglas C-15 —1975

### Technical Specifications (YC-15, Ser. No. 72-1875)

Type: STOL tactical transport.

Manufacturer: McDonnell Douglas Aircraft Corp., Long Beach, California.

Total military versions: 2 (USAF).

Capacity: Crew of three plus 150 troops or 78,000 lbs. of cargo.

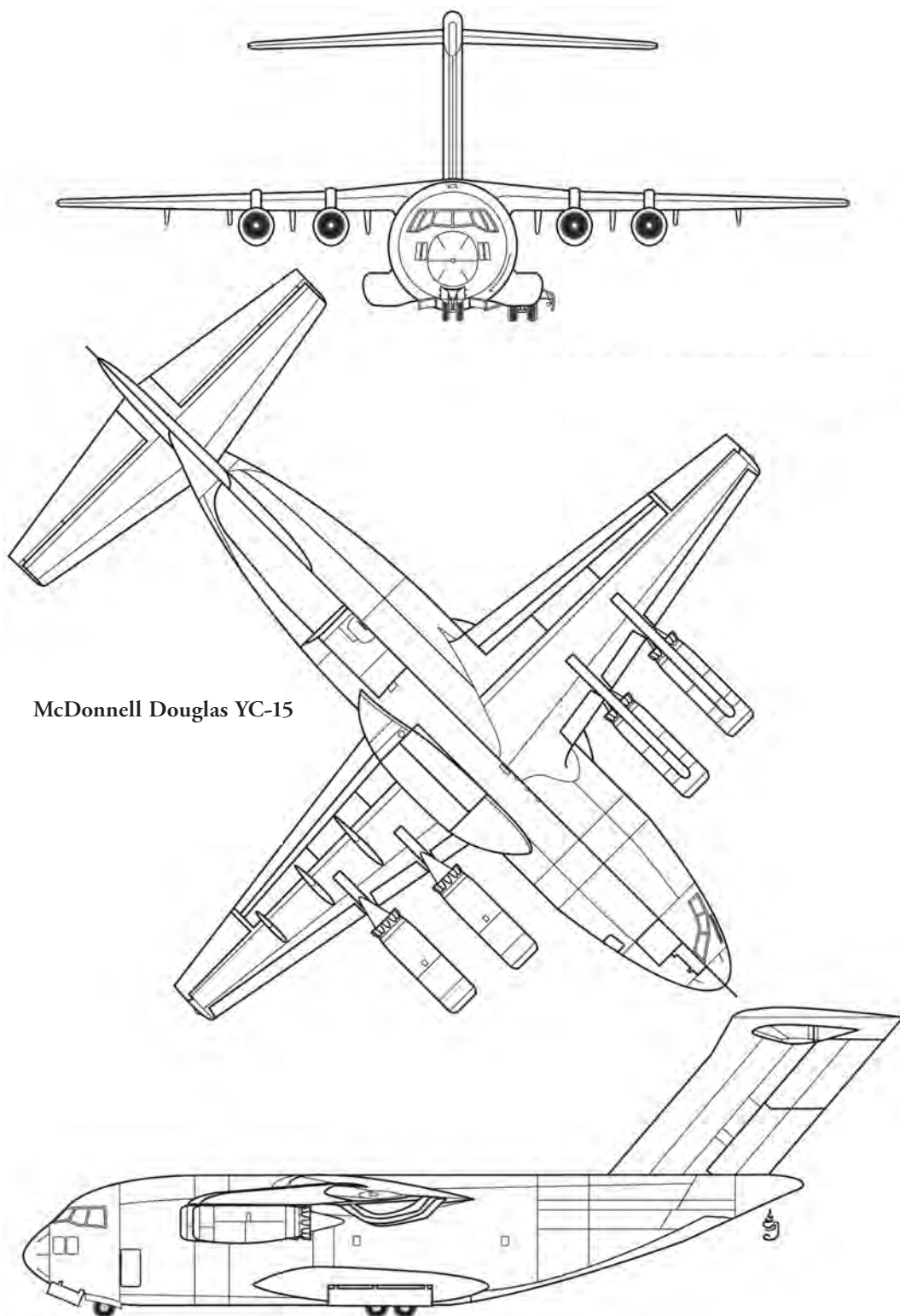
Powerplants: Four Pratt & Whitney JT8D-17 turbofan engines, each rated at 16,000 lbs./s.t.

Performance: Max. speed 590-mph, cruise 543-mph; ceiling 30,000 ft.; range 2,990 mi.

Weights: 117,400 lbs. empty, 216,680 lbs. max. takeoff.

Dimensions: Span 132 ft. 7 in., length 124 ft. 3 in., wing area 1,740 sq. ft.

Along with Boeing’s YC-14, the McDonnell Douglas YC-15 originated as one of two designs to be considered by the USAF under the Advanced Medium STOL Transport (AMST) requirement issued in 1972. Planned to replace the Lockheed C-130, AMST envisaged a pure jet tactical transport that could lift a 27,000 lb. payload from a 2,000-foot rough airstrip while flying to and from logistics bases at speeds in the 500-mph range (50 percent faster than a C-130). Like the YC-14, the McDonnell Douglas engineering team settled on a straight-wing layout with a supercritical, high-lift-low-drag airfoil section, but instead of the USB configuration, selected externally blown flaps in which the exhaust of the under-mounted engines was directed toward a system of double-slotted flaps. Part of the exhaust would be deflected downward against the lower flap surfaces while, due to the Coandă effect, the airflow passing through the slots would



McDonnell Douglas YC-15



**The first YC-15 prototype in 1976. It differed from the second prototype in having 22 feet 4 inches greater wingspan. The aircraft returned to flight status as a technology demonstrator from 1996 to 1998.**

follow the downward curve of the upper surfaces. The YC-15 design, incidentally, borrowed the nose gear of a DC-8 and a nose section derived from the DC-10. A contract issued in November 1972 authorized McDonnell Douglas to proceed with construction of two YC-15 prototypes. To evaluate differences in low and high-speed flight performance, the first prototype was completed with a wingspan of 132-feet 7-inches while the second came with a span of 110-feet 3-inches.

The first YC-15 prototype flew on August 26, 1975, and the second followed it in December. Since the YC-14 was nearly a year behind it, competitive trials between the AMST prototypes at Edwards AFB did not begin until late 1976. During evaluations over the next year, the two types of aircraft were subjected to extensive field-testing that involved lifting a variety of military payloads in and out of short, semi-prepared airfields. Although testing revealed that both the YC-14 and YC-15 met or exceeded the AMST requirements under most conditions, the USAF had by that time moved away from the original AMST concept in favor of a larger strategic transport with some tactical capabilities. In late 1979, the USAF officially announced cancellation of AMST and requested new design proposal under an entirely new project named C-X (Cargo Transport Aircraft-Experimental). After reviewing various C-X design proposals from 1979 to 1981, which included an enlarged, three-engine extrapolation of Boeing's YC-14 and new versions of Lockheed's C-5 and C-141, USAF officials selected McDonnell Douglas as prime contractor, to proceed with a much enlarged and revised development of the YC-15 under the assigned designation C-17, later known as the Globemaster III.

When the test program ended, the two YC-15 prototypes were flown to Davis Monthan AFB, Arizona to be placed in AMARC storage, and one subsequently became an outdoor static exhibit at the Pima Air Museum. The first prototype (72-1875) was returned to flying status in 1996, to be used as a technology demonstrator to test possible new C-17 applications; however, after an engine failure followed by an emergency landing in mid-1998, the aircraft was grounded,

remaining at Boeing's facility at Palmdale, California until 2008, when it was moved by road to Edwards AFB to be placed on display at the USAF Flight Test Center Museum.

**C-16 (reserved for the De Havilland DHC-6  
Twin Otter but not used; see under  
De Havilland UV-18 in Series III)**

**Lockheed US-3 Viking —1976**

**Technical Specifications (US-3A)**

Type: Carrier onboard delivery (COD) transport.

Manufacturer: Lockheed Aircraft Corp. Marietta, Georgia.

Total military versions: 7 (USN).

Capacity: Crew of three plus six passengers or 4,680 lbs. of cargo.

Powerplants: Two General Electric TF34-GE-2 turbofan engines, each rated at 9,275 lbs./s.t.

Performance: Max. speed 493-mph, cruise 405-mph; ceiling 40,900 ft.; range 3176 mi.

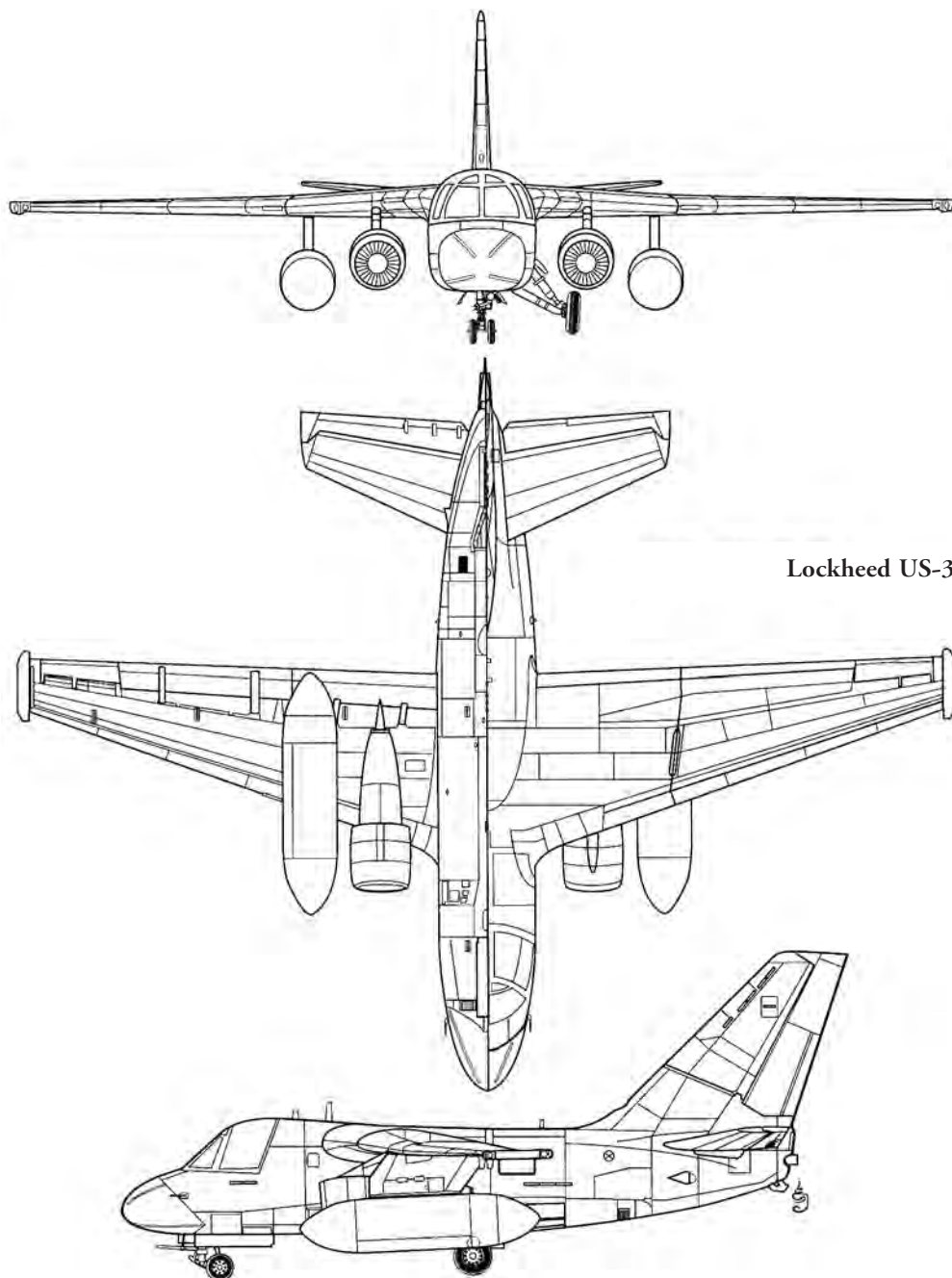
Weights: 26,581 lbs. empty, 52,539 lbs. max. takeoff.

Dimensions: Span 68 ft. 6 in., length 53 ft. 4 in., wing area 598 sq. ft.

The Lockheed S-3A Viking, flown for the first time in January 1972, began entering service with Navy units in early 1974 as the fleet's replacement for the piston-engine Grumman S-2 in the carrier-based ASW role, and the last of 176 was delivered in 1978. During this timeframe,



US-3A of VRC-50 preparing to take off from the deck of the USS *Carl Vinson* in 1987. This aircraft, originally one the YS-3A pre-production models, became the first US-3A in 1976.



Lockheed US-3A

the Navy was also considering procurement of a new type of COD transport as a replacement for the piston-engine C-1A (see Grumman TF [C-1] in Series I, Part A). In 1976, as demonstrator, one of the YS-3A prototypes underwent a conversion which involved removing the ASW equipment and two of the crew positions in order to create a space behind the cockpit for six passengers or up to 4,680 lbs. of cargo.

For additional cargo, provision was made for pods, known as “blivets,” to be carried under



each wing on pylons in place of fuel tanks. After completing its first flight on July 2, 1976, the demonstrator was turned over to the Navy for official evaluations under the designation US-3A. With the plan of using them for high priority missions, NAVAIR subsequently ordered six more US-3A conversions to be made from existing airframes but elected not to place the type into quantity production. Eventually, in the early 1980s, NAVAIR decided to meet the COD shortfall by placing the Grumman C-2 back into production.

As the newly converted US-3As arrived for duty, they entered operational service with Fleet Logistics Squadron VRC-50, where they were used to support carriers assigned to the Pacific Fleet; and later, during the Gulf War, US-3As also flew numerous sorties from carriers operating in the Persian Gulf. After one US-3A was lost in an accident, the other six remained active through the mid-1990s, the last example being retired in 1998. After leaving service they were placed in AMARC storage at Davis-Monthan AFB, Arizona .

## **McDonnell Douglas (Boeing) C-17 Globemaster III —1991**

### **Technical Specifications (C-17A)**

Type: Long-range strategic and tactical airlift transport.

Manufacturer: McDonnell Douglas Aircraft Corp. (acquired by Boeing in 1997), Long Beach, California. Total military versions: 205 (USAF), not including foreign exports.

Capacity: Crew of three plus 134 troops, 34 medical litters and 54 ambulatory cases, or 170,900 lbs. of cargo.

Powerplants: Four Pratt & Whitney F117-PW-100 high-bypass turbofan engines, each rated at 40,400 lbs./s.t.

Performance: Max. speed 570-mph, cruise 515-mph; ceiling 45,000 ft.; range 2,785 mi.

Weights: 282,500 lbs. empty, 585,000 lbs. max. takeoff.

Dimensions: Span 169 ft. 10 in., length 174 ft., wing area 3,800 sq. ft.

In 1979, a number of concerns — chief among them the eventual retirement of its fleet of 270 C-141Bs — prompted the USAF to abandon the AMST project (see Boeing YC-14 and McDonnell Douglas YC-15, above) in favor of a new program named C-X (Cargo Transport Aircraft-Experimental). Instead of STOL tactical capability, C-X placed emphasis on a much larger aircraft that would fulfill the strategic airlift role of the C-141 with the added ability to perform tactical airlift, tactical air-drops, and medical evacuation. In response to a request for proposals circulated in October 1980, the USAF reviewed a number of prospective designs which included a larger, three-engine adaptation of the YC-14 from Boeing, a much-enlarged and redesigned development of the YC-15 from McDonnell Douglas, and revised designs of the C-141 and C-5 from Lockheed. McDonnell Douglas was declared winner of the C-X competition in August 1981, however, a full-scale development contract was not forthcoming until December 1985 when the company received the go-ahead to proceed with construction of an aircraft to be designated the C-17, with the expectation that it would be ready for testing sometime in 1990.

While sharing some general similarities with the YC-15, the final design of the C-17 emerged 40 percent larger, with 25-degrees of wing-sweep for better cruise efficiency. The enormous power generated by the new computer-augmented F117 turbofan engines — developed originally for the Boeing 757 airliner as the PW2000 — would enable it to lift nearly twice (170,900 lbs.) the payload of a C-141. In terms of the technology applied to its design, the C-17 brought large military transports up to a new state-of-the-art. Boasting twice the interior volume of the C-141, the C-17's 88-ft. × 18-ft. × 12.3-ft. cargo bay accommodated virtually all of the Army's air-transportable equipment and could be rapidly configured to hold either 18 (7 ft. × 9 ft.)



**McDonnell Douglas C-17A**





**Spectacular view of 13 C-17As over the Blue Ridge Mountains in 2005 while flying a low-level tactical exercise that combined elements of the 437th and 315th Airlift Wings out of Charleston AFB, South Carolina.**

cargo pallets, 102 fully equipped paratroops, 48 litter and 54 ambulatory medical evacuees, three AH-64 attack helicopters, one Abrams main battle tank, three Bradley fighting vehicles, or combinations of wheeled vehicles and pallets. Air-drop procedures were greatly streamlined by a 40-unit container delivery system (CDS). Though not fully STOL like the YC-15, the design of the C-17 wing still incorporated supercritical high-lift, low-drag airfoil sections and externally blown, double-slotted flaps that would enable it to land on airfields as short as 3,000 feet in forward combat areas. Other advanced features included a fly-by-wire control system (with sticks in place of yokes), multifunction cockpit displays with an HUD for each pilot, and use of composite materials in major control surfaces and secondary structural components. For operations in forward combat zones, the C-17 came with an onboard defensive suite consisting of an AAR-47 passive missile warning receiver together with an ALE-47 expendable countermeasures system that included flares, chaff, and jammers.

At the time of the original contract award in 1985, the USAF anticipated procurement of 210 C-17s, however, a combination of development delays and limits on funding caused the order to be scaled-back to 120 production aircraft in 1990. Meanwhile, the maiden flight of the prototype C-17 (known as T-1) took place from the Long Beach plant on September 14, 1991, and by the end of the next year, four production C-17As had also arrived at Edwards AFB to undergo extensive testing and evaluations, and the name Globemaster III was assigned in early 1993. But the C-17 program ran into serious difficulties early on. Load testing of the wings on one of two static test airframes in late 1992 revealed fatigue cracks and structural failures that entailed an entire redesign of internal structure at an additional cost of \$100 million. Two-plus

years of flight-testing demonstrated that the aircraft did not meet required specifications in terms of weight, fuel burn, payload, and range; and airflow around the aft fuselage interfered with parachute deployment during air-drops.

In mid-1994, as a result of ongoing development problems and large cost overruns, the Department of Defense (DOD) strongly considered halting C-17A production at 37 aircraft but opted to proceed after McDonnell Douglas agreed to correct all of the chief concerns. Sufficient progress had been made by early 1996 to induce DOD to add 80 C-17As to the original 120, and since that time (after the Boeing takeover in 1997), 23 more have been ordered. As of mid-2011, the USAF has accepted delivery of 205 C-17As (not including T-1) and 18 are still forthcoming. Starting with the 71st aircraft in 2001, the C-17A production line incorporated a wing center-section fuel tank extending range, and these aircraft are unofficially known as the C-17A-ER. Besides USAF sales, Boeing has delivered 23 C-17As and C-17A-ERs to foreign customers, with outstanding orders for 24 more. In 2007 Boeing proposed a C-17B tactical airlift version having revised flaps, additional main landing wheels, and more powerful engines, however, no production plans have been announced by the USAF at this writing. Boeing is also reportedly exploring the possibility of upgrading part the existing C-17A fleet to the B standard on a piecemeal basis.

Deliveries of early production C-17As to the 437th Airlift Wing at Charleston AFB, South Carolina began in mid-1993, but continuing development problems delayed full operational readiness until early 1995. Once operational, C-17As began to show their exceptional logistical capabilities, setting 22 new records for hauling oversized payloads, and under the test of combat for the first time in 1999, demonstrated great versatility and turnaround times while meeting



Lineup of C-17As at Keesler AFB, Mississippi, preparing to deliver supplies for victims of Hurricane Katrina. Official debate over keeping the C-17 production line open but this has not been conclusively decided.

the strategic airlift requirements for Operation Allied Force (Kosovo). More recently, Globemaster IIIs have been an essential component of USAF logistical support for Operations Enduring Freedom (Afghanistan) and Iraqi Freedom. In March 2003, in the largest airborne assault since the invasion of Panama, AMC C-17As airdropped 1,000 paratroopers over Bashur, Iraq, then quickly turned around to deliver tanks, fighting vehicles, artillery, and other military equipment to frontal units. At the end of 2010, subject to overall AMC operational control, some 203 C-17As and C-17A-ERs were equipping the following active, reserve, and ANG units: 437th (active) and 315th (USAFR) Airlift Wings (AW), Charleston AFB, South Carolina; 62nd (active) and 446th (USAFR) Airlift Wings, McChord AFB, Washington; 97th (active) Air Mobility Wing, Altus AFB, Oklahoma; 172 (ANG) Airlift Wing, Jackson-Evers ANGB, Mississippi; 305th (active) and 514th (USAFR) Air Mobility Wing, McGuire AFB, New Jersey; 3rd (active) and 176th (ANG) Wings, Elmendorf AFB, Alaska; 15th (active) Airlift Wing and 154th (ANG) Wing, Hickam AFB, Hawaii; 60th (active) and 349th (USAFR) AMW, Travis AFB, California; 412th (active) Test Wing, Edwards AFB, California; 436th (active) Airlift Wing, Dover AFB, Delaware; 445th (USAFR) Airlift Wing, Wright-Patterson AFB, Ohio; and 105th (ANG) Airlift Wing, Stewart ANGB, New York. Under current operational arrangements, and in addition to standard logistical duties, AMC C-17s may also be diverted to support U.S. Special Operations Command (SOCOM).

## **C-18 (see Boeing C-135 and -137 in Series I, Part A)**

### **Boeing C-19, C-25, and C-33 —1990**

#### **Technical Specifications (VC-25A)**

Type: Long-range logistical and presidential transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 2 (USAF).

Capacity: Crew of 26 plus 76 passengers.

Powerplants: Four General Electric CF6-80C2B1 high-bypass turbofan engines, each rated at 56,700 lbs./s.t.

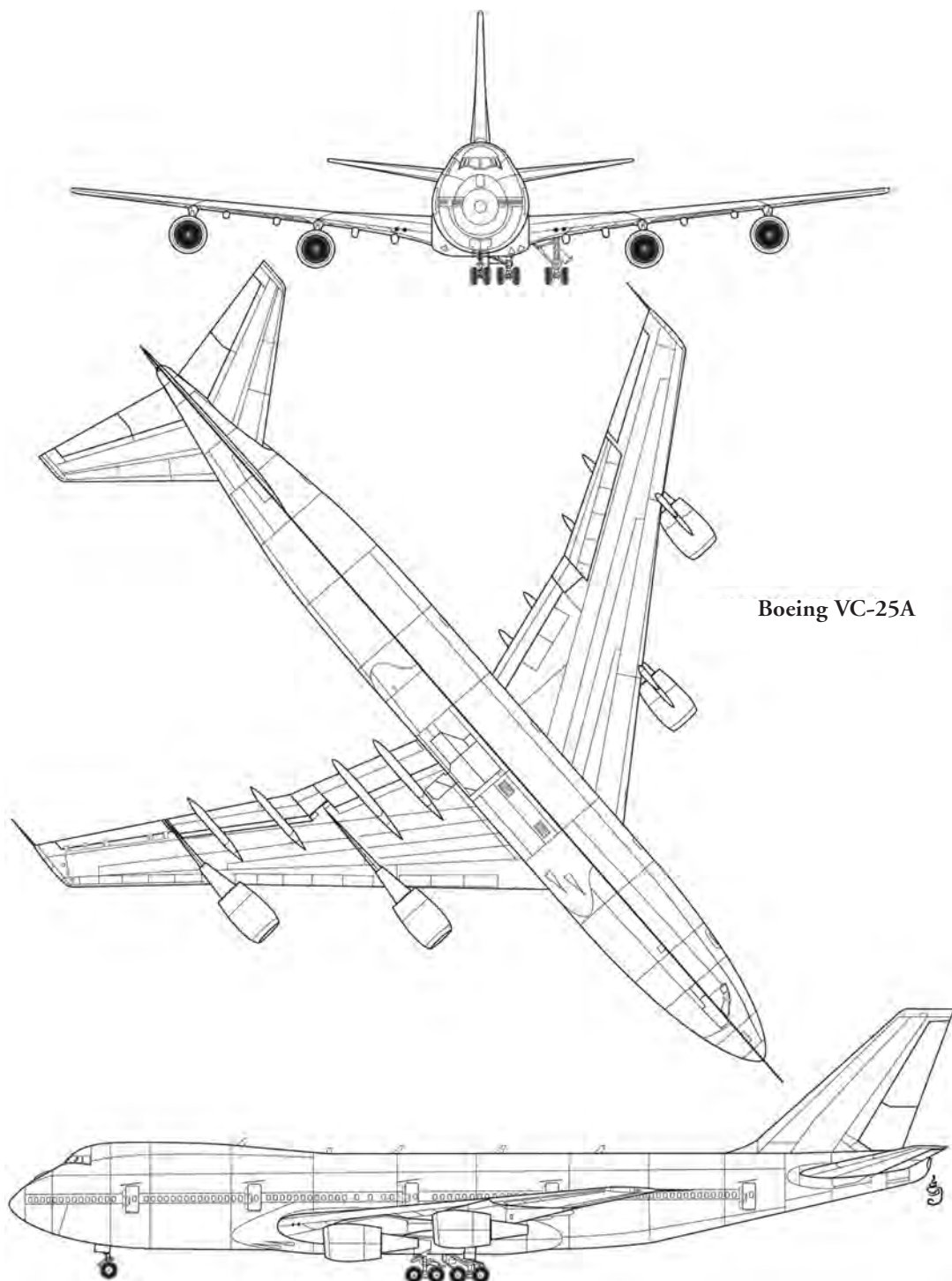
Performance: Max. speed 630-mph, cruise 558-mph; ceiling 45,100 ft.; range 7,800 mi.

Weights: 383,500 lbs. empty, 833,000 lbs. max. takeoff.

Dimensions: Span 195 ft. 8 in., length 231 ft. 5 in., wing area 5,500 sq. ft.

The Boeing 747, flying for the first time in 1969 and entering regular airline service in 1970, was the world's first wide-body commercial airliner and since that time, 1,420 examples have been delivered in five major versions (747-100, -200, -300, -400, and -8I/8F [freighter]), with outstanding orders (100+ in 2011) and prospective sales likely to keep it in production for the foreseeable future. With the exception of the VC-25As described below, no 747s have been procured for the U.S. military services; however, as part of the Civil Reserve Air Fleet (CRAF), Boeing 747s of participating airlines (Pan American and Northwest initially) have carried the military designation C-19A. While never appearing in any type of military markings, these aircraft did undergo, at government expense, modifications that entailed installation of a cargo door and a reinforced floor, with the airlines receiving a government subsidy to offset the cost of operating the aircraft at the additional weight (i.e., 13,000 lbs.). One source indicates that the Department of Defense (DOD) actually ordered one or more C-19As (747-100s in a convertible cargo/passenger configuration) for Air National Guard use but canceled it prior to any aircraft being built. During the mid-1990s, because of protracted development and cost overruns





**Boeing VC-25A**



**Public relations photograph of VC-25A Air Force One flying over Mount Rushmore in South Dakota. Two VC-25As make up the Presidential Flight, and one becomes Air Force One when the president is on board.**

in the C-17 program, DOD considered acquiring a militarized version of the stretched 747-400 as the C-33A but ultimately abandoned the idea in favor of proceeding with C-17 production.

During 1985, when the two Boeing VC-137Cs assigned to the Presidential Flight had been in service 23 and 13 years, respectively, the USAF issued an official request for proposals for a three or four-engine replacement having an un-refueled range of at least 6,000 miles. After considering versions of the Boeing 747 and McDonnell Douglas DC-10, the Boeing entry was selected and a contract subsequently awarded in 1986 for two identical 747-200Bs under the designation VC-25A. In addition to specified interior appointments — presidential suite, conference/situation room, guest accommodations, secret service quarters, medical annex, etc.— the aircraft included specially hardened navigation, electronic, and communications equipment as well as capability for in-flight refueling. The first VC-25A was delivered in September 1990, followed by the second in March 1991. Both aircraft are presently attached to the 89th Airlift Wing, based at Andrews AFB, Maryland, and when one is flying with the President aboard, it operates under the call sign “Air Force One.”

## Gates Learjet C-21—1984

### Technical Specifications (C-21A)

Type: Light cargo, passenger, and aeromedical transport.

Manufacturer: Gates Learjet Corp. (Bombardier after 1990), Tucson, Arizona.

Total military versions: 77 (USAF, ANG).

Capacity: Crew of two plus eight passengers or 2,000 lbs. of cargo.

Powerplants: Two Garrett TFE731-2-2B turbofan engines, each rated at 3,500 lbs./s.t.

Performance: Max. speed 530-mph, cruise 558-mph; ceiling 45,000 ft.; range 2,306 mi.

Weights: 10,119 lbs. empty, 18,300 lbs. max. takeoff.

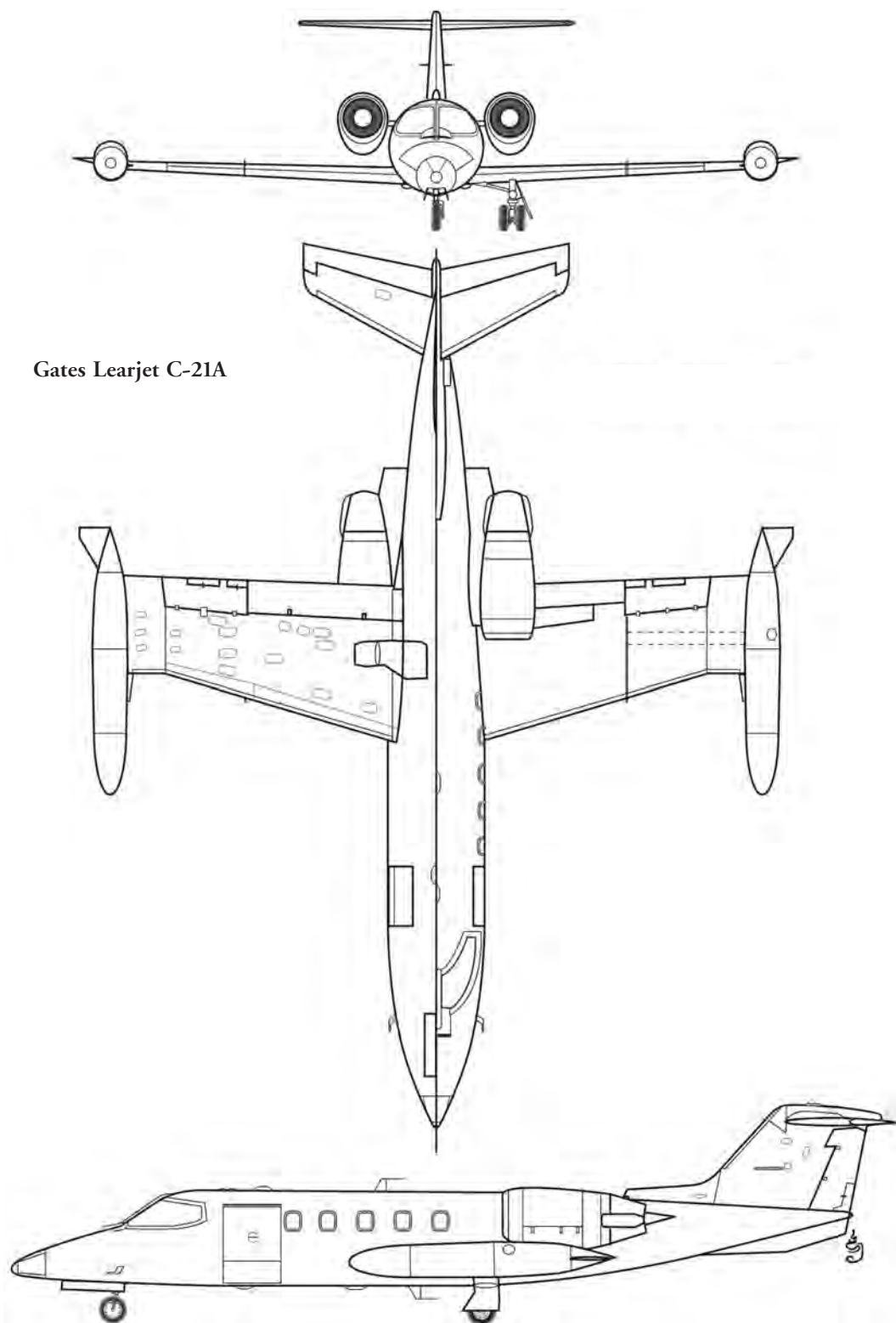
Dimensions: Span 39 ft. 6 in., length 48 ft. 7 in., wing area 253 sq. ft.

When Bill Lear's eight-place Learjet model 23 made its appearance in 1963, it effectively launched corporate and business aviation into the Jet Age. A succession of improvements on the original concept resulted in the introduction of the models 24 and 25 in 1966 and the model 35 in 1973. Although one model 23 and one model 24 were acquired by NASA during the mid-1960s, no military designations were ever applied. The first true military variants materialized in 1984 with purchase of the first of 77 off-the-shelf Learjet model 35As for USAF and ANG units under the designation C-21A. The model 35/35A differed from earlier versions in having a five-foot, two-inch fuselage stretch, a five-foot increase in wingspan, greater fuel capacity, and upgraded engines.

The 73 C-21As assigned to the USAF were initially distributed among various continental U.S. and overseas commands as staff transports, with secondary duties of carrying high-priority cargos and medical patients; the four ANG examples entered service as staff transports for the National Guard Bureau. In 1997, most USAF C-21As in the U.S. were consolidated under AMC control within the 375th Airlift Wing at Scott AFB, Illinois. A number of C-21As were also



C-21A of North Dakota Air National Guard seen taking off from the Hector International Airport in Fargo in 2007. At the time, the 119th Fighter Wing (NDANG) was in the process of transitioning from F-16Cs to C-21As.



Gates Learjet C-21A

allocated to the USAF Flight Standards Agency at Andrews AFB, Maryland and to the Air Education and Training Command (AETC) at Keesler AFB, Mississippi. Though AMC began to phase-out some C-21As in 2007, ten remained in service with U.S. Air Forces in Europe (USAFE) and three with AETC; and 16 of the ex-USAf examples were allocated to the ANG. As of mid-2011, there are 38 C-21As listed as active USAF and 18 serving in ANG units.

## Boeing C-22 —1982

### Technical Specifications (C-22B)

Type: Medium range staff transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 6 (USAF, ANG).

Capacity: Crew of seven plus 131 passengers or 63,102 lbs. of cargo.

Powerplants: Three Pratt & Whitney JT8D-7 turbofan engines, each rated at 14,000 lbs./s.t.

Performance: Max. speed 631-mph, cruise 569-mph; ceiling 36,100 ft.; range 3,105 mi.

Weights: 80,602 lbs. empty, 160,000 lbs. max. takeoff.

Dimensions: Span 108 ft., length 133 ft. 2 in., wing area 1,700 sq. ft.

The Boeing model 727, considered by many to have been the DC-3 of the Jet Age, began its long and distinguished career as a civil passenger airliner in 1964. Its novel rear-mounted, three-engine layout arose as a compromise between a range of four-engine and two-engine requirements issued by several major airlines for an intermediate range transport to replace existing piston-engine and turboprop equipment. Other innovations included a T-tail empennage and a sophisticated wing design employing a combination of leading edge slats/flaps and triple-slotted, full-span trailing edge flaps that allowed the aircraft to operate from runways as short as 4,500-feet. Boeing produced 727s in two major versions: the 727-100 series, accommodating up to 149 passengers in maximum density seating; and the 727-200 series, introduced in 1967

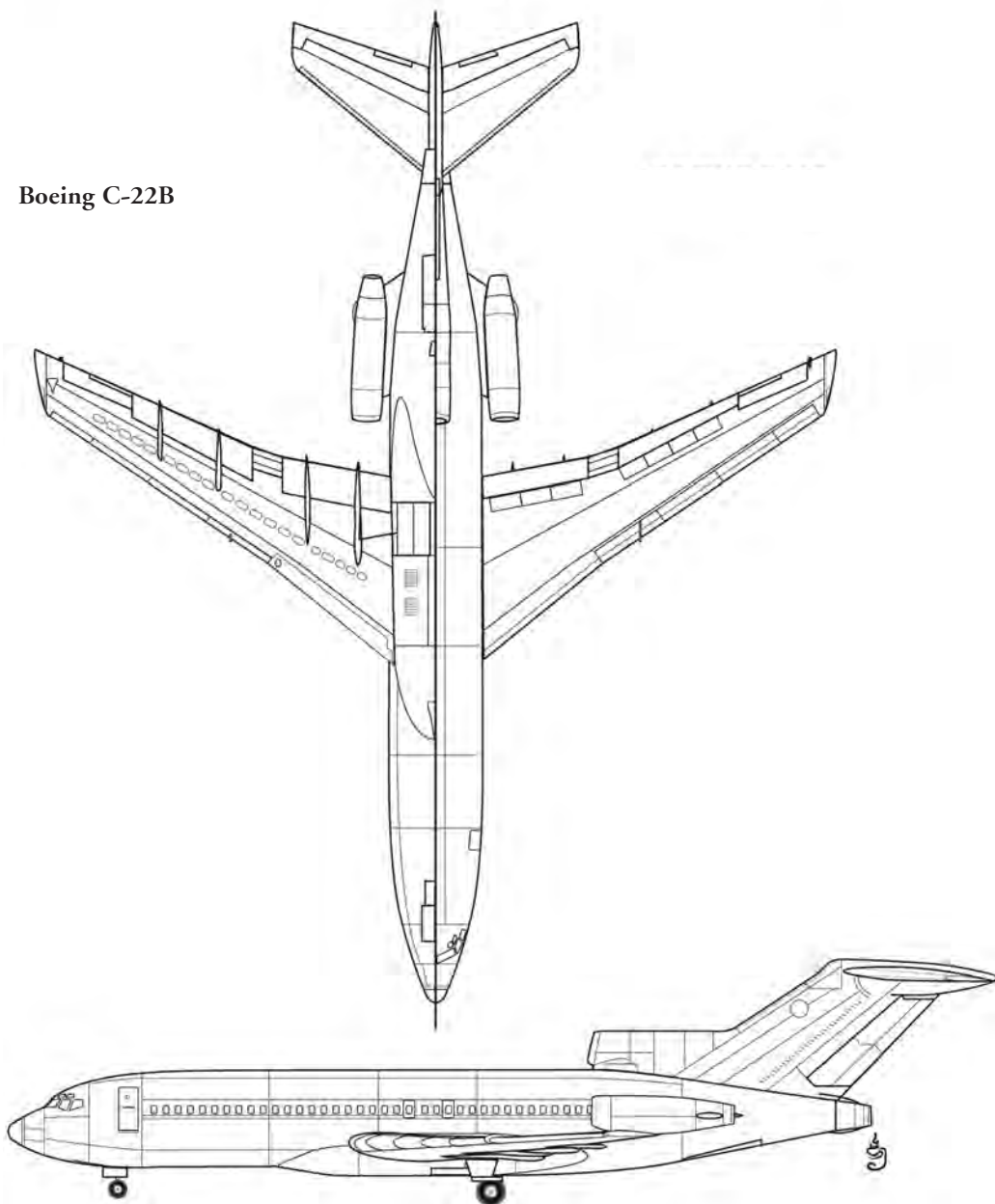


One of four ex-airline 727-130s acquired by the USAF in 1983 as the C-22B. Three examples still reported to be in service are operated by District of Columbia ANG aircrews to airlift personnel for the National Guard Bureau.





**Boeing C-22B**



with a 20-foot fuselage stretch, accommodating up to 189. When Boeing delivered the last of 1,832 727s in 1984, it had been produced in greater numbers than any other type of jet transport until being overtaken by its Boeing 737 stablemate during the 1990s.

Although 727s were never procured new by any of the U.S. military branches, the USAF later acquired five ex-airline examples under the designation C-22: one 727-100 in 1982 as the C-22A; four 727-130s in 1983 as the C-22B; and one 727-212 in 1983 as the C-22C. The single C-22A served as a staff transport with USAF Southern Command until being replaced by a C-32A (Boeing 757) during the late 1990s; the four C-22Bs and the C-22C, maintained and operated by the District of Columbia ANG, were assigned to the National Guard Bureau to airlift personnel. As of mid-2011, three C-22Bs still appear on the ANG inventory.

## Bell-Boeing CV/MV-22 Osprey—1989

### Technical Specifications (MV-22B)

Type: V/STOL tactical and special operations transport.

Manufacturer: Bell Textron Helicopter Co., Ft. Worth, Texas and Boeing Defense, Space, and Security Co., Philadelphia, Pennsylvania.

Total military versions: 143 (17 USAF; 126 USMC).

Capacity: Crew of two plus 32 troops or 15,000 lbs. of cargo.

Powerplants: Two 6,150-shp Rolls-Royce Allison T406/AE1107C turboshaft engines driving three-bladed Bell-Boeing fully controllable proprotors.

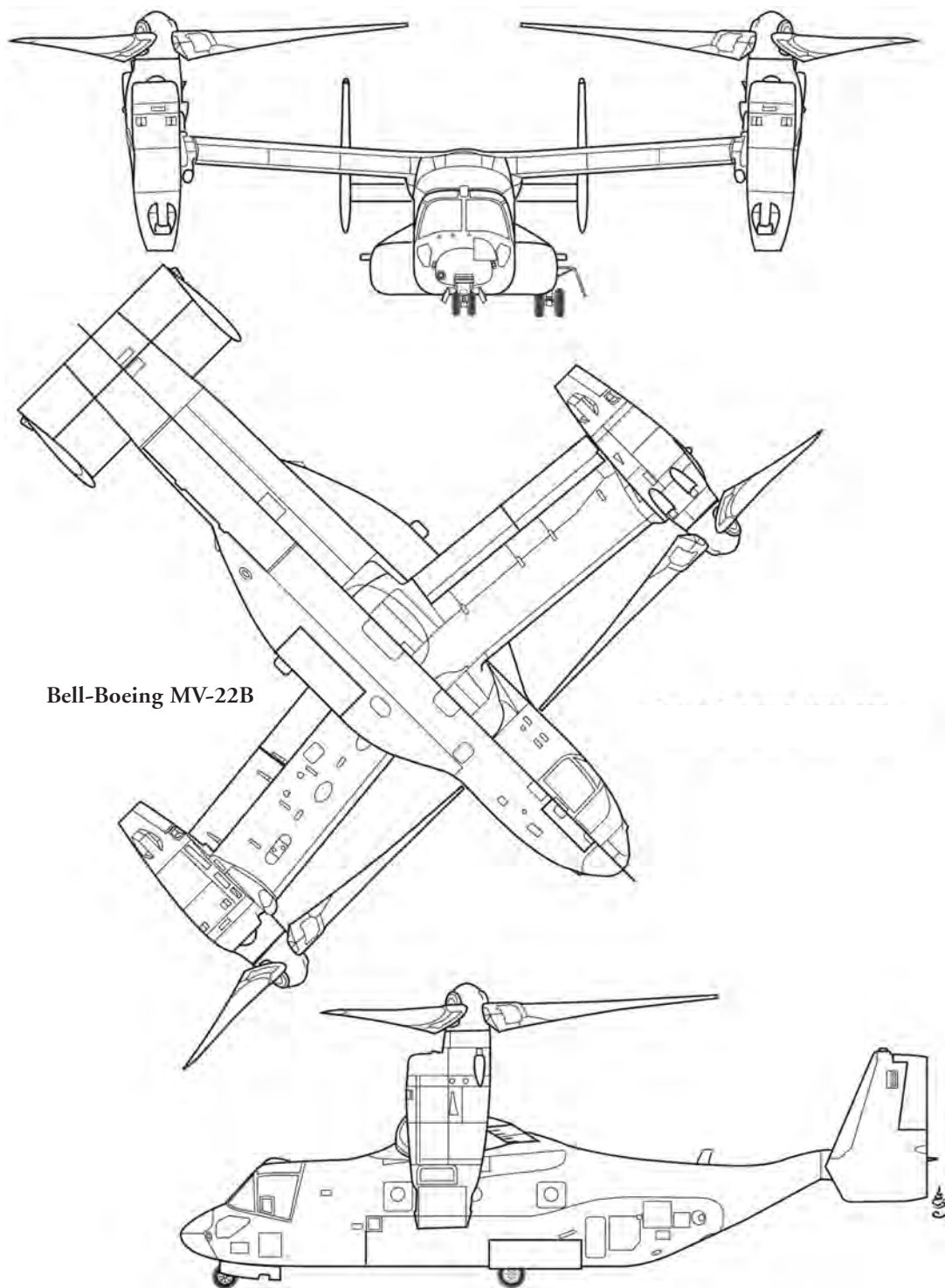
Performance: Max. speed 351-mph, cruise 277-mph; ceiling 26,000 ft.; range 860 mi.

Weights: 33,140 lbs. empty, 60,500 lbs. max. takeoff.

Dimensions: Span 45 ft. 10 in. (84 ft. 7 in. with rotors), length 57 ft. 4 in., wing area 301 sq. ft. (rotor disc area 2,268 sq. ft.).

Fifteen years after abandoning the tilt-wing LTV XC-142A (see Series I, Part A, above), the Department of Defense (DOD) revived the V/STOL tactical transport concept in 1981 with the Joint-Service Vertical Takeoff/Landing Experimental (JVX) program. JVX stemmed from the testing two Bell XV-15 demonstrators, which starting in 1977, proved the viability of a tilt-rotor system having contra-rotating proprotors on wingtip-mounted engines which tilted through an arc of 97-degrees, together with cross-coupled transmissions that would drive both proprotors in the event of an engine failure. The JVX requirement contemplated an aircraft that could lift a load similar to the CH-47 helicopter and operate from the same landing zones, yet possess twice the combat radius and cruise 125-mph faster. In 1983, following a DOD request for design proposals, Bell and Boeing, in partnership, received a JVX development contract to produce six full-scale prototypes under the designation V-22A, officially named “Osprey.” To handle its dual flight profile, the V-22A featured a triple-redundant fly-by-wire control system which automatically commanded it to fly like a helicopter while the nacelles were vertical, then fly like an airplane when they transitioned to the horizontal.

In the interval since the maiden flight of the first V-22A on March 19, 1989, the complexities of program have generated a very lengthy and controversial gestation period (i.e., 16 years). When the Army decided to withdraw from participation early on, DOD authorized Bell-Boeing to plan on development of two major production variants, the MV-22 for the Marines (prefix “M” assigned to avoid confusion with the CV carrier designation) and the CV-22 for the USAF. When testing was suspended in 1991, after two prototypes were destroyed in crashes, Bell-Boeing commenced a major redesign effort that resulted in introduction of the improved V-22B and a resumption of testing in early 1993. Bell-Boeing received approval to proceed with the engineering manufacturing development (EMD) phase in mid-1994, flying the first production MV-22B in



Bell-Boeing MV-22B



Marine MV-22B of VMM-263 shown landing aboard the USS *Bataan* (LHD-5) in 2008. First flight to official operational acceptance took 16 years (1989–2005).



USAF CV-22B serving with the 8th Special Operations Squadron is seen with nacelles in a horizontal flight configuration while flying over the Florida coastline in early 2009. Procurement plans call for up to 50 aircraft.

February 1997 and delivering four examples for official service trials in May 1999. However, two more crashes in 2000 led to a second grounding, which delayed further evaluations until certain key components could be redesigned and replaced. The MV-22B finally achieved operational acceptance in June 2005.

Deliveries of MV-22Bs to frontline Marine squadrons began in December 2005 and will continue up to a planned level of 360 aircraft by 2019. Compared to the CH-46E Sea Knights they are replacing, MV-22Bs can lift three times the payload, transit to the landing zone 120-mph faster, and operate at over twice the combat radius. Initial combat deployment took place in September 2007 when 10 MV-22Bs of VMM-263 arrived for duty in Iraq, and then in late 2009, MV-22Bs of VMM-261 began flying combat sorties in Afghanistan. As of early 2012, the Marines had 126 MV-22Bs operating in all three Air Wings with 12 different units, as follows: VMM-161, -162, -165, -166, -261, -263, -264, -266, -365, and -561, and VMVT-204 (training) and VMX-22 (test and evaluation).

The USAF's first production CV-22B joined to the 58th Special Operations Wing (SOW) for service trials at Kirtland AFB, New Mexico in October 2007, with AFSOC declaring the type fully operational with the 8th Special Operations Squadron (SOS) in March 2009, which deployed six of the aircraft to Iraq for combat duty the following August. Deliveries to the USAF are expected to continue up to a planned procurement of 50 aircraft. AFSOC currently has 17 CV-22Bs in frontline service with the 8th SOS, 71st SOS, and 20th SOS. The Navy remains a potential user of the V-22, possibly to replace the C-2A(R) in the COD role, plus Great Britain's Royal Navy, the Indian Navy, and Israeli Defense Forces have all expressed interest in the type.

## Short C-23 Sherpa—1984

### Technical Specifications (C-23B)

Type: Light tactical transport.

Manufacturer: Short Brothers Aviation, Ltd. (acquired by Bombardier in 1989), Belfast, Northern Ireland (U.K.).

Total military versions: 66 (18 USAF; 46 U.S. Army/Army NG).

Capacity: Crew of three plus 20 passengers or troops or 4,325 lbs. of cargo.

Powerplants: Two 1,198-shp Pratt & Whitney PT6A-45R turboprop engines driving five-bladed Dowty-Rotol fully reversible, constant-speed propellers.

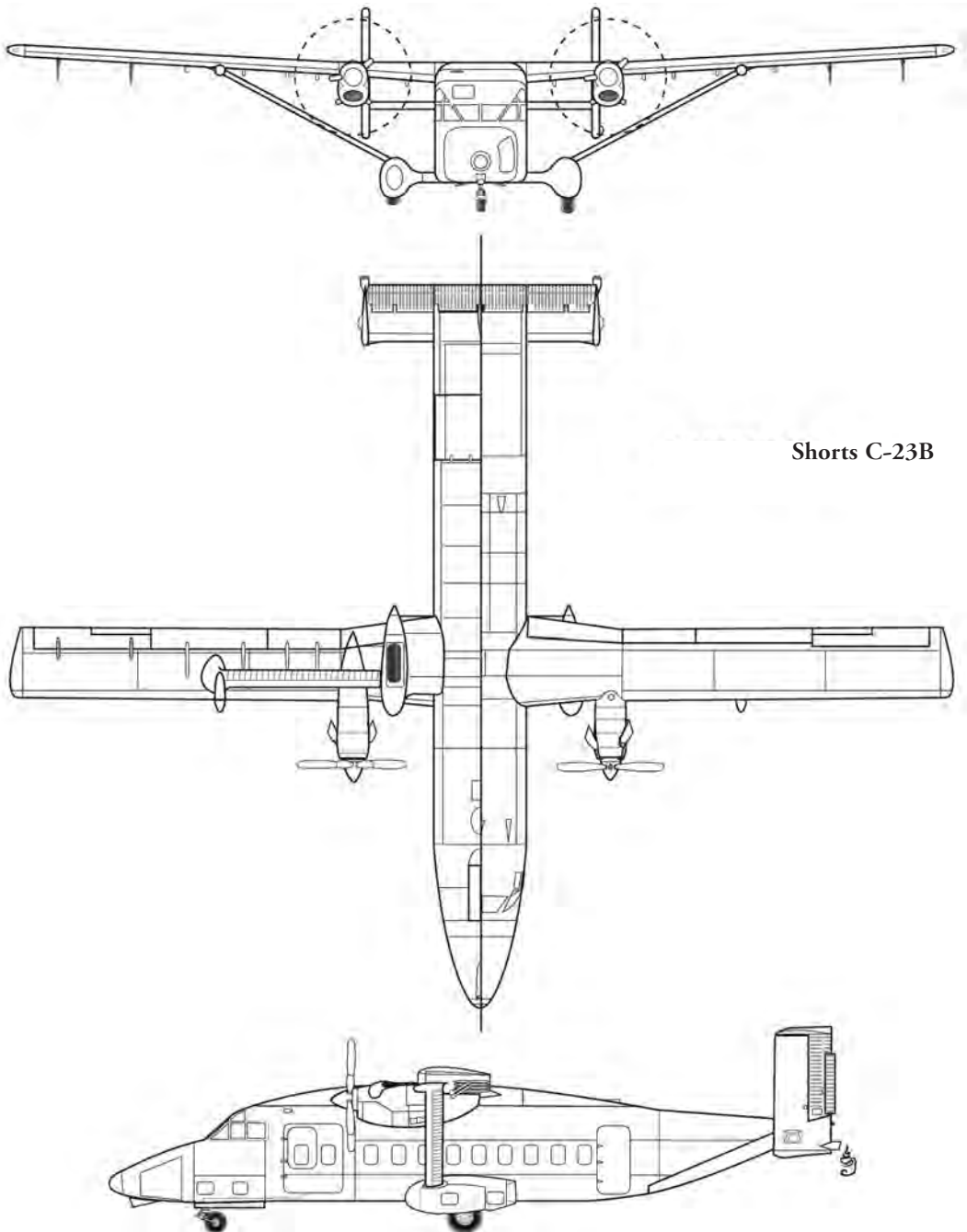
Performance: Max. speed 218-mph, cruise 184-mph; ceiling 12,000 ft.; range 770 mi.

Weights: 14,200 lbs. empty, 22,900 lbs. max. takeoff.

Dimensions: Span 74 ft. 10 in., length 58 ft., wing area 456 sq. ft.

After enjoying success with its Skyvan SD3 STOL commuter airliner and light cargo design, Short Brothers introduced the SD330 in 1976 with new engines, an 18-foot fuselage stretch, a 10-foot increase in wingspan, and nearly doubled takeoff weight. The design was characterized by a square fuselage cross-section, strut-braced, high-aspect ratio wings, and a twin-fin tail group. In 1982, with a view toward military sales, Short developed the SD330-UTT (utility tactical transport) with a strengthened floor, paratroop doors, and a full-width rear cargo ramp. Its five-foot six-inch square by 20-foot long cargo bay could be configured to carry either 30 passengers, 18 medical litters, or four air-droppable cargo pallets. The USAF became an early customer in 1983 when it ordered 18 SD330-UTTs that began entering service in 1984 under the designation C-23A with the factory name Sherpa. Between 1985 and 1987, the Army purchased six ex-civil SD330s to serve as interim replacements for some of its aging C-7 Caribous. These six aircraft received Army serial numbers but were never modified to military standards or given an official military designation.





As a consequence of a series of acquisitions from the late 1980s to the mid-1990s, C-23 variants became most numerous type (i.e., 44 aircraft total) of intra-theater, fixed-wing tactical transport in the Army inventory. Army interest in the type was driven by the desire to obtain a simple and relatively inexpensive fixed-wing transport having a cargo capacity similar to that of a Boeing CH-47 Chinook helicopter. The record of C-23 procurement by the Army, in terms of precise dates, quantities, and variants delivered, is somewhat unclear. It appears the Army



**USAF C-23A shown in late 1980s while serving with the 10th Military Airlift Squadron at Zweibrücken AB, Germany. Following retirement in 1990, eight C-23As were transferred to the U.S. Forestry Service and six to the Army.**

awarded Short an initial contract in 1988 that accounted for acceptance of 16 new SD330-UTTs under the designation C-23B, and added to it a follow-up order for three more during the mid-1990s. The C-23B was essentially identical to the A except for the addition of cabin side windows. In 1990 or 1991, the USAF transferred six of its C-23As to Army control, some of which may have been upgraded to the B standard and re-designated. In 1994, the Army awarded a contract to Bombardier for the remanufacture of 20 ex-civil SD360s to a specification that involved installation of the aft fuselage and twin-fin empennage of the SD330-UTT and adding all of the military features of the C-23B. The 20 remanufactured aircraft, designated C-23B+, came with 1,424-shp PT6A-65A engines and six-bladed propellers that increased takeoff weight to 25,600 lbs. and boosted cruise speed to 223-mph. A least two C-23B+s, upgraded with digital cockpit avionics suites and global air traffic management (GATM) navigation systems, have since been returned to service as the C-23C.

As delivered in the mid-1980s, all 18 of the USAF's C-23As were placed under overall MAC control in service with the 10th Military Airlift Squadron (MAS) based at Zweibrücken AB, Germany. Their mission, known as the European Distribution System (EDS), involved transporting spare parts and components from USAFE maintenance and distribution centers to frontline USAF and NATO bases in Europe. In 1990, when the EDS program ended as part of the Cold War demobilization, four C-23As were reassigned to Edwards AFB to support the Test Pilots School, eight were given to the U.S. Forestry Service, and six were transferred to the Army. The four remaining USAF C-23As later served in a utility cargo role for Air Material Command but have since been withdrawn.

The Army's six ex-civil SD330s, which were used by the National Guard to transport spare parts and personnel between bases, were apparently withdrawn from service as soon as new C-23Bs became available to replace them. One ex-USAF C-23A is known to have been assigned to the Army Aviation Technical Center (ATTC) at Ft. Rucker, Alabama, as an electronics flying testbed, however, disposition of the other five C-23As is not recorded anywhere. The rest of the Army's C-23Bs and B+s have been operated by the Army National Guard as part of the Operational Support Airlift Agency (OSAA) and serve in detachments distributed among 19 different



Called the “Flying Winnebago” by the troops, this Army C-23B was photographed at an undisclosed location in Iraq during late 2004. Most C-23Bs are operated by National Guard aircrews.

bases located in the continental U.S., Puerto Rico, and Virgin Islands. Since 2001, a number of OSAA C-23s have been deployed to overseas bases in Turkey, Afghanistan, and Iraq. The Army’s plan to replace its aging C-23 fleet with the new Alenia C-27J Spartan (see, below) has been placed on indefinite hold, so that the 43 C-23B/B+/Cs currently listed on Army inventory are likely to remain in service for the foreseeable future.

## Douglas C-24 —1985

### Technical Specifications (EC-24A)

Type: Electronic warfare training platform and long-range transport.

Manufacturer: Douglas Aircraft Corp., Long Beach, California.

Total military versions: 1 (USN).

Capacity: Flight crew of three (electronic crew unknown) plus a payload of 109,000 lbs.

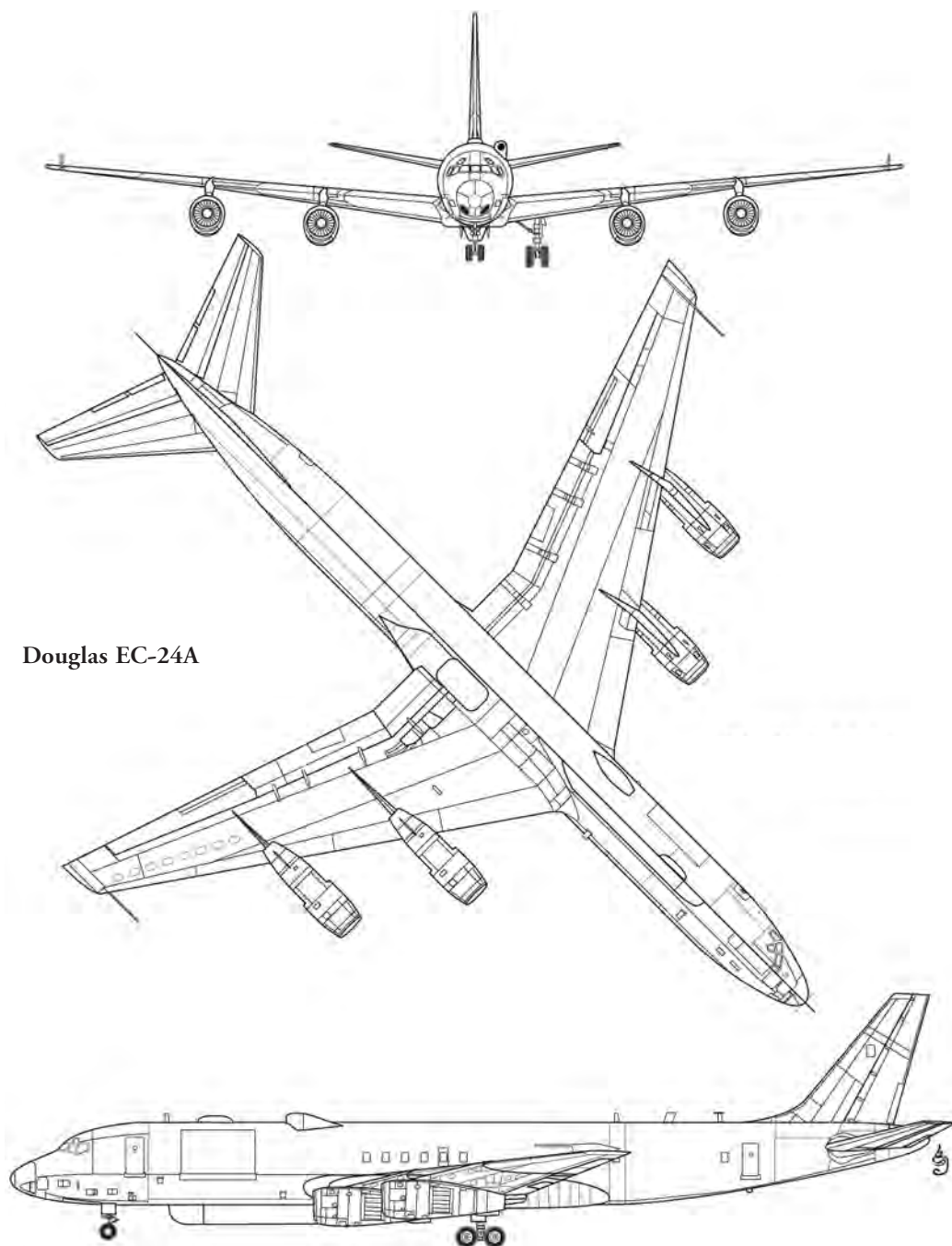
Powerplants: Four Pratt & Whitney JT3D-3B turbofan engines, each rated at 18,000 lbs./s.t.

Performance: Max. speed (not reported), cruise 593-mph; ceiling 36,000 ft.; range 5,716 mi.

Weights: 132,325 lbs. empty, 315,000 lbs. max. takeoff.

Dimensions: Span 142 ft. 5 in., length 150 ft. 6 in., wing area 2,868 sq. ft.

The Douglas DC-8, flown for the first time in May 1958, is distinguished as the second pure-jet transport of American manufacture (Boeing’s 707 was first) to enter regular airline service. From 1958 to 1972 Douglas (later McDonnell Douglas) produced a total of 556 DC-8s in six major variants, and on August 21, 1961, a DC-8 Series 40 became the first civil jet to exceed the speed of sound in a dive (i.e., Mach 1.012). Internet sources report that an estimated 30 DC-8 variants are still in commercial service as of early 2011. While no new DC-8s were ever procured



Douglas EC-24A

new by any of the U.S. military services, a single ex-United Airlines DC-8-54F acquired by the Navy in 1987 was subsequently modified and placed in service as an electronic warfare test platform under the designation EC-24A. The aircraft, assigned to the Naval Test Wing Pacific at NAS Point Mugu, California, was readily identifiable by a large, belly mounted external electronics pod on the right side between the wing and nose gear. The electronic suite carried by the EC-24A enabled it to simulate “aggressor aircraft” in airborne tactical exercises. After being



Rare picture of Navy EC-24A taken at Piedmont Triad International Airport, North Carolina, in 1992. Though technically not a transport, it was the only DC-8 to have entered military service.

withdrawn from active service in 1998, the EC-24A was placed in storage at Davis-Monthan AFB, Arizona.

## Fairchild C-26 Metroliner—1989

### Technical Specifications (C-26B)

Type: Light staff and logistics transport.

Manufacturer: Fairchild-Swearingen Corp. (later Fairchild Aviation Corp.), San Antonio, Texas.

Total military versions: 50 (32 USAF/ANG; 12 U.S. Army; 6 USN).

Capacity: Crew of two plus 22 passengers or 5,000 lbs. of cargo.

Powerplants: Two 1,100-shp Garret TPE331-12UA-701G turboprop engines driving four-bladed McCauley fully reversible, constant-speed propellers.

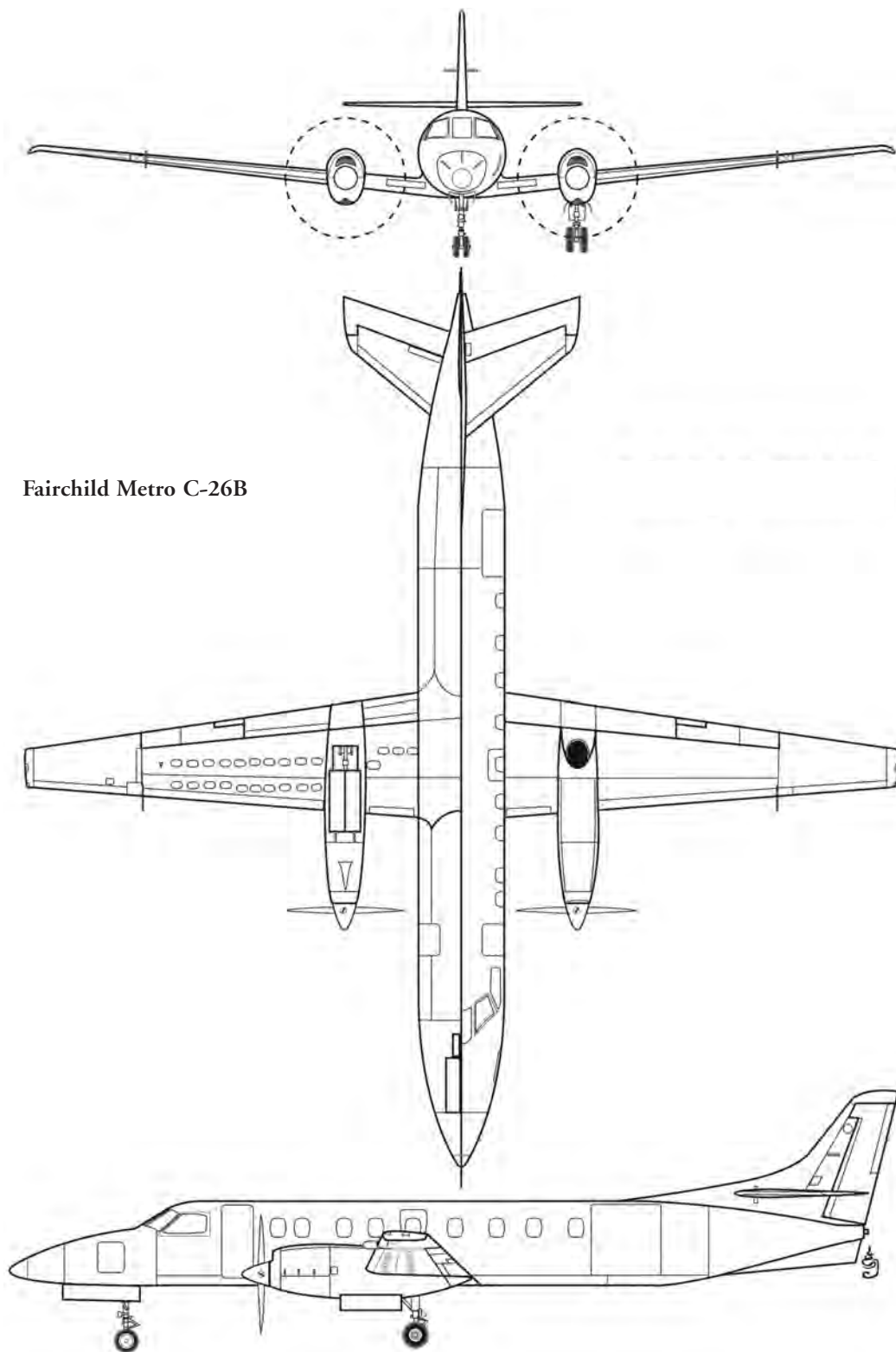
Performance: Max. speed 331-mph, cruise 285-mph; ceiling 31,000 ft.; range 2,346 mi.

Weights: 9,500 lbs. empty, 16,500 lbs. max. takeoff.

Dimensions: Span 46 ft. 3 in., length 42 ft. 2 in., wing area 310 sq. ft.

Swearingen Aircraft (merged with Fairchild in 1971) introduced its Metro I 19-passenger commuter airliner to the civil market in 1969, followed by a series of improved versions as the Metro II/IIA (1974), Metro III (1980), and 22-passenger Metro IV/23 (1988), with over 600 of all types having been delivered when production ceased in 1998. All Metro variants were typified by a slender, circular-section fuselage, sharply tapered wings with thin airfoil sections, and a swept, cruciform tail group. The first military derivatives appeared in 1988 with a USAF purchase of 11 Metro IIIs (model SA227-AC) under the designation C-26A, two of which were subsequently diverted to the Venezuelan Air Force under the Military Assistance Program (MAP). The next order came in 1989 for three improved Merlin IIIs (model SA227-BC) entering service as the C-26B, two delivered to the Army and one to the USAF. During 1991, Fairchild received orders for 37 Metro 23s (model SA227-DC), also designated C-26B, 26 procured by the USAF





Fairchild Metro C-26B



**One of six Navy C-26Ds (formerly a USAF C-26B) photographed in 2009 while landing at Luga International Airport in Malta. About 28 C-26 variants are thought to be in service with U.S. military branches (courtesy Daniel Compton).**

and 11 by the Army, and after delivery, a small number of the USAF aircraft were transferred to the Peruvian Air Force under MAP. Sometime in the mid-1990s, the Army acquired an ex-civil Merlin IVC (model SA227-AT, executive version of Metro III) that was placed in service as the C-26C. In 1998, the USAF transferred six C-26Bs to the Navy which were re-designated C-26D.

Once in service, a number of C-26s received new designation prefixes following modifications for specialized duties. Eleven USAF C-26Bs fitted with electronic surveillance equipment for drug interdiction became the RC-26B and the Army C-26C, after being equipped with an integrated sensor package (radar and forward looking infrared), became the UC-26C. Three of the Navy C-26Ds were fitted with radar to support missile range operations, one becoming the EC-26D and other two, the RC-26D. All USAF and Army C-26As and Bs were initially distributed among various ANG and Army National Guard units for logistics support to transport personnel, medical evacuees, and high-priority cargos. Since being modified, the 11 USAF RC-26Bs have been operated by ANG units to support federal counter-drug operations, and the Army UC-26C was assigned to the National Guard Bureau for the same purpose. The four Navy C-26Ds were based in Europe to provide forward deployment logistics support, and the EC-26D and the two RC-26Ds in Hawaii to support the Barking Sands Pacific Missile Range Facility. As of mid-2011, 11 ANG C/RC-26Bs and 11 Army C-26Bs are still listed as operational; the status of the six Navy C/EC/RC-26Ds is not known.

## **Aeritalia/Alenia C-27 Spartan — 1991**

### **Technical Specifications (C-27J)**

Type: Intra-theater tactical transport.

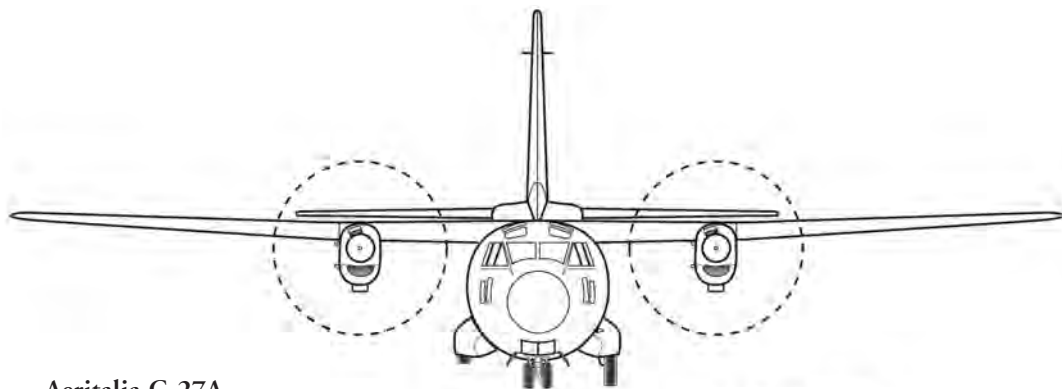
Manufacturer: Aeritalia Aeronautica, SpA. (later Alenia Aeronautica and L-3 Communications), Turin and Naples, Italy.

Total military versions: 14 (USAF).

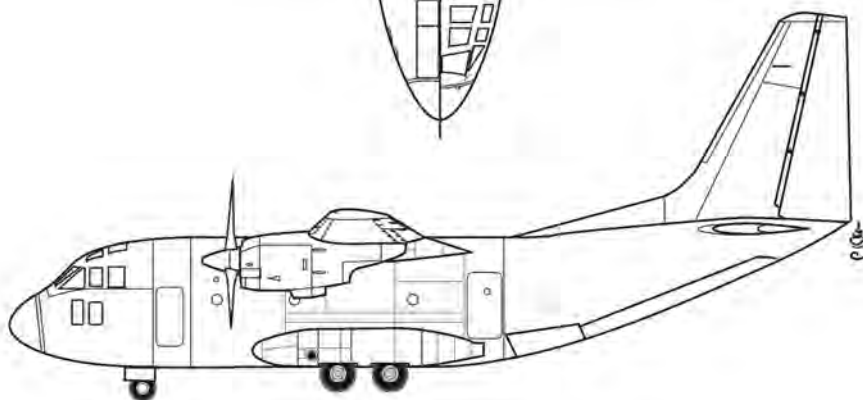
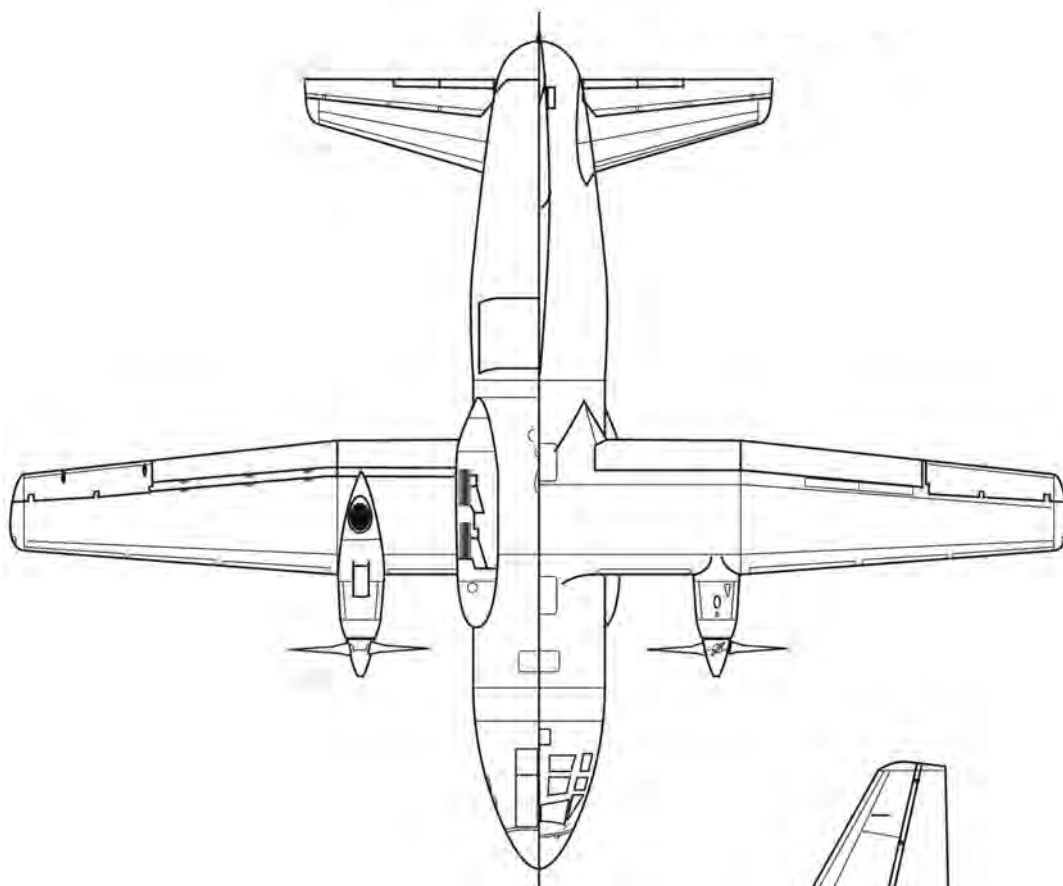
Capacity: Crew of three plus 60 troops, 36 medical litters, or 25,353 lbs. of cargo.

Powerplants: Two 4,640-shp Rolls-Royce AE2100-D2A turboprop engines driving six-bladed Dowty-Rotol fully reversible, constant-speed propellers.

Performance: Max. speed 374-mph, cruise 340-mph; ceiling 30,000 ft.; range 2,650 mi.



Aeritalia C-27A



Weights: 37,479 lbs. empty, 67,241 lbs. max. takeoff.

Dimensions: Span 94 ft. 2 in., length 74 ft. 5 in., wing area 883 sq. ft.

Aeritalia, a subsidiary of Fiat, flew its G.222 tactical transport for the first time in 1970, and production G.222As began entering service with the Italian Air Force in 1978. Due a similar general layout, the G.222A resembled a shortened, twin-engine version of the Lockheed C-130. In August 1990, after issuing a requirement known as the rapid response intra-theater airlifter (RRITA), the USAF selected the G.222A over the Spanish-designed CASA CN-235 and subsequently awarded Chrysler Technologies (Aeritalia's U.S. partner) a series of contracts that resulted in procurement of 10 aircraft under the designation C-27A, with initial deliveries commencing in 1991. C-27As were powered by 3,400-shp General Electric T64-P4D turboprop engines driving three-bladed Hamilton Standard propellers and could carry either 19,840 lbs. of cargo, 53 troops, or 36 medical litters at 273-mph over a range of 852 miles.

Starting in 1995, Alenia (Aeritalia's corporate successor) and Lockheed Martin began a joint venture to develop an improved C-27 version that would incorporate the glass cockpit and AE2100 engines of the C-130J. The maiden flight of the first prototype, billed as the C-27J Spartan, took place on September 24, 1999, and early testing revealed significant improvements in cruise speed (+25 percent), range (+35 percent), and payload (+11 percent) over the C-27A. However, efforts to market the C-27J in the U.S. did not actually begin to move forward until late 2005 when the Department of Defense (DOD) announced the Joint Cargo Aircraft (JCA) program. JCA represented a merger of separate Army and USAF projects aimed at developing a small intra-theater tactical transport to replace older aircraft such as the C-12, C-23, and C-26, and in the Army's case, reduce reliance on its CH-47 Chinook helicopters. Once Lockheed withdrew from its partnership with Alenia after entering the C-130J in the JCA competition, Alenia formed an association with L-3 Communications as its new U.S. partner to advance the



USAF C-27A attached to the 24th Wing of Air Forces Panama as seen in the late 1990s. The ten aircraft provided logistical support to SOUTHCOM counter-narcotics operations until 1999.



**C-27J demonstrator pulling condensation vortices off the props at the Paris Air Show in 2007. Four C-27Js are thought to be in service with the 702nd Expeditionary Airlift Squadron ANG at the date of this writing.**

C-27J. Other competitors in the JCA program included the CASA C-295 offered by a consortium of Raytheon and the European Aeronautic Defence and Space Company (EADS). Finally, in June 2007, DOD declared the C-27J as winner of the JCA competition, with Alenia/L-3 receiving a fixed-price contract to produce up to 78 aircraft. At the time, DOD contemplated that 54 C-27Js would be procured for the Army and 24 for the USAF.

The first production C-27J was delivered to the Army in September 2008, followed by a second aircraft in early 2009. Then in May 2009, in a move reminiscent of the much earlier inter-service dispute over the C-7 Caribou (see, above), the USAF asked DOD for control over all C-27Js (including the two delivered to the Army), with the understanding that ANG units would operate them in direct support of Army operations. As a compromise, in late 2009, DOD directed that the C-27Js would thereafter be placed under overall USAF control but be operated by both ANG and Army National Guard aircrews. In the interim, as a consequence of USAF plans to procure more C-17As and C-130Js and the Army's need to modernize its helicopter fleet, DOD limited the C-27J production contract limited to 38 aircraft, including the four on



hand by late 2010. In addition to C-27J sales to the U. S., Alenia has reportedly received foreign contracts to deliver 46 aircraft, with potential orders in the offing for many more.

All 10 C-27As, as delivered, were placed in service with the USAF Southern Air Division (later Air Forces Panama) based at Howard AFB in the Panama Canal Zone. Their primary mission was to provide logistical airlift to SOUTHCOM counter-narcotics operations in the Central and South American regions. The C-27As also flew missions in the late 1990s in support of United Nations peacekeeping operations in Ecuador and Peru. In early 1999, with the impending closure of Howard AFB, six C-27As were withdrawn from active USAF service and placed in AMARC storage; the other four were transferred to the U.S. State Department's Bureau of International Narcotics and Law Enforcement Affairs where, out of Patrick AFB, Florida, they are still being used to support counter-narcotics activities in South America. At present, four C-27J Spartans have been delivered to the USAF, including the two formerly under Army control. Operated by the 702nd Expeditionary Airlift Squadron, a joint ANG and Army National Guard unit, the C-27Js made their first combat deployment to Afghanistan in August 2011.

## Cessna C-28 Titan —1987

### Technical Specifications (C-28A)

Type: Light logistics and staff transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

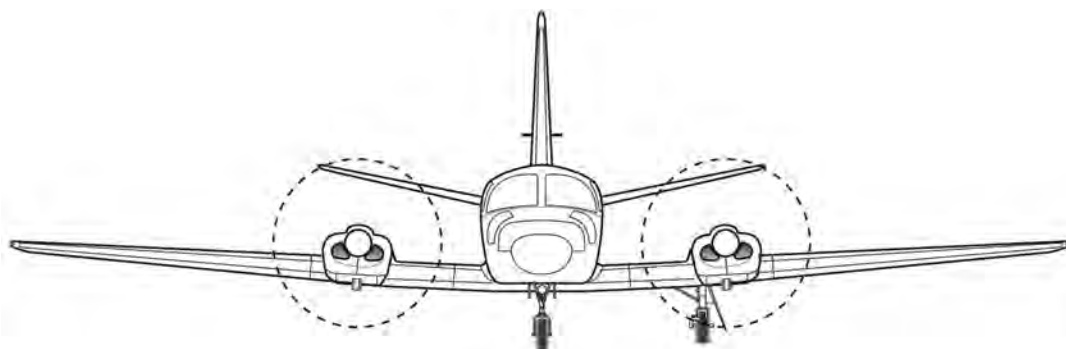
Total military versions: 2 (USN).

Capacity: Crew of two plus 10 passengers or 3,500 lbs. of cargo.

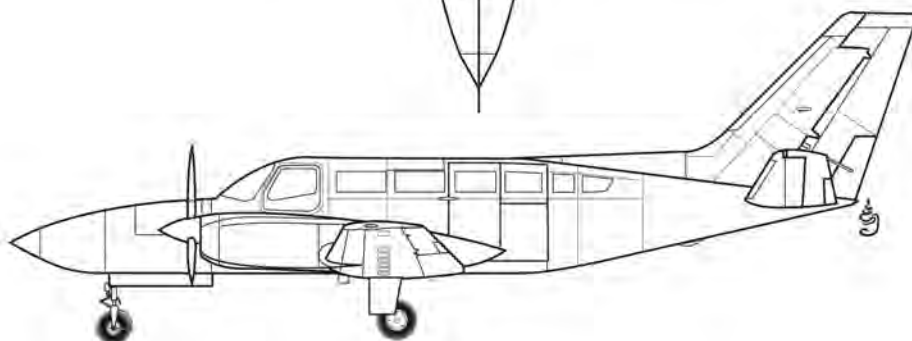
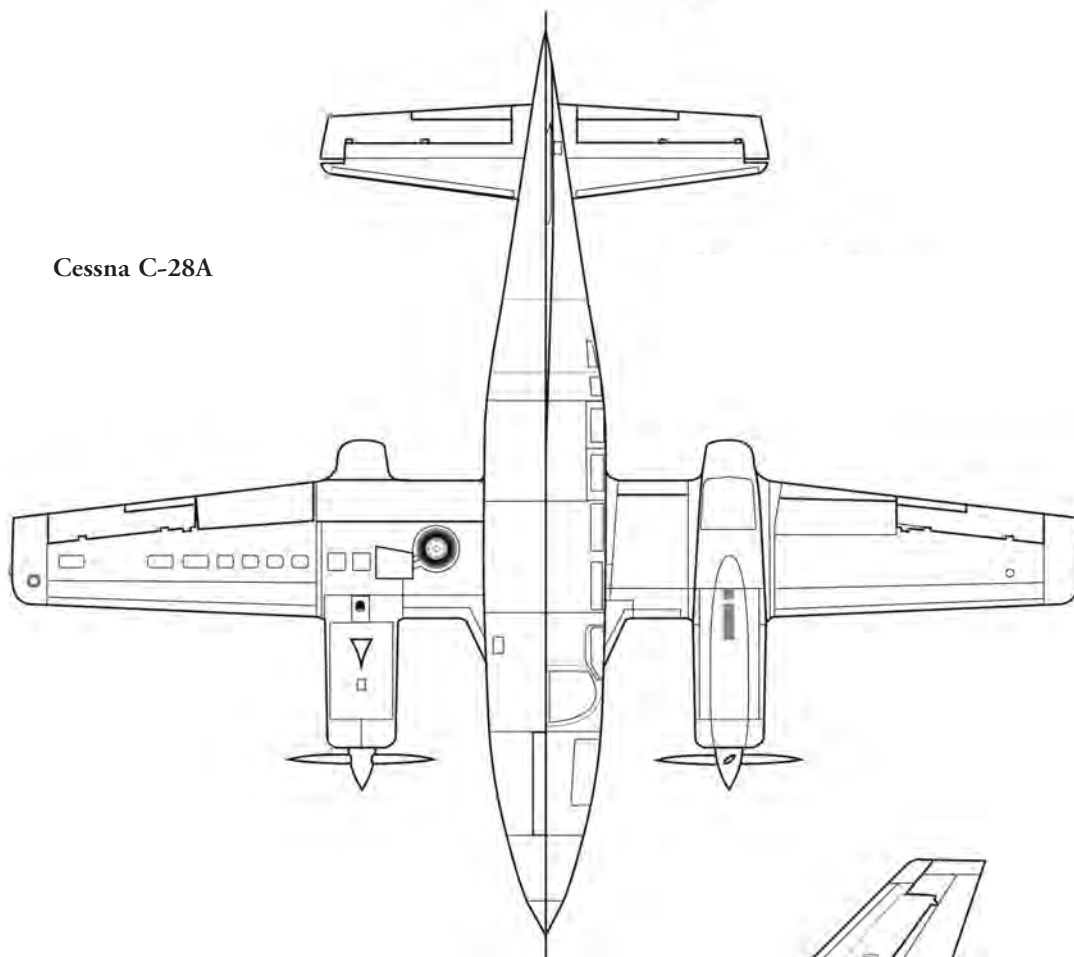
Powerplants: Two 375-hp Continental GTSIO-520M 6-cylinder horizontally opposed engines driving three-bladed McCauley constant-speed propellers.



Two ex-civil Cessna 404s were purchased by the Navy in 1987 as the C-28A. Photograph depicts a similar example serving with the British Maritime and Coast Guard Agency in 1977.



Cessna C-28A



Performance: Max. speed 267-mph, cruise 188-mph; ceiling 26,000 ft.; range 2,119 mi.  
Weights: 4,834 lbs. empty, 8,400 lbs. max. takeoff.  
Dimensions: Span 46 ft. 4 in., length 39 ft. 6 in., wing area 242 sq. ft.

Offered in either 10-passenger, convertible passenger-cargo, or all-freight versions, Cessna introduced its unpressurized model 404 Titan to the civil market in 1975 and produced 396 examples between 1976 and 1982. At the time, it was largest type of piston-engine aircraft ever manufactured by Cessna. The Navy acquired two ex-civil 404s during the late 1980s that were placed in service under the designation C-28A. No information is available as to their assignment and operational use, however, both are thought to have been withdrawn in 2001.

## British Aerospace C-29 —1990

### Technical Specifications (C-29A)

Type: Light transport and navigation and combat system inspection platform.  
Manufacturer: British Aerospace, PLC (BAe), Chester, England (U.K.).  
Total military versions: 12 (USAF).  
Capacity: Crew of two plus 14 passenger or 2,400 lbs. of cargo.  
Powerplants: Two Allied Signal (Garret) TFE731-5BR turbofan engines, each rated at 4,656 lbs./s.t.  
Performance: Max. speed 560-mph, cruise 525-mph; ceiling 41,000 ft.; range 2,753 mi.  
Weights: 15,598 lbs. empty, 28,000 lbs. max. takeoff.  
Dimensions: Span 51 ft. 4 in., length 51 ft. 2 in., wing area 375 sq. ft.

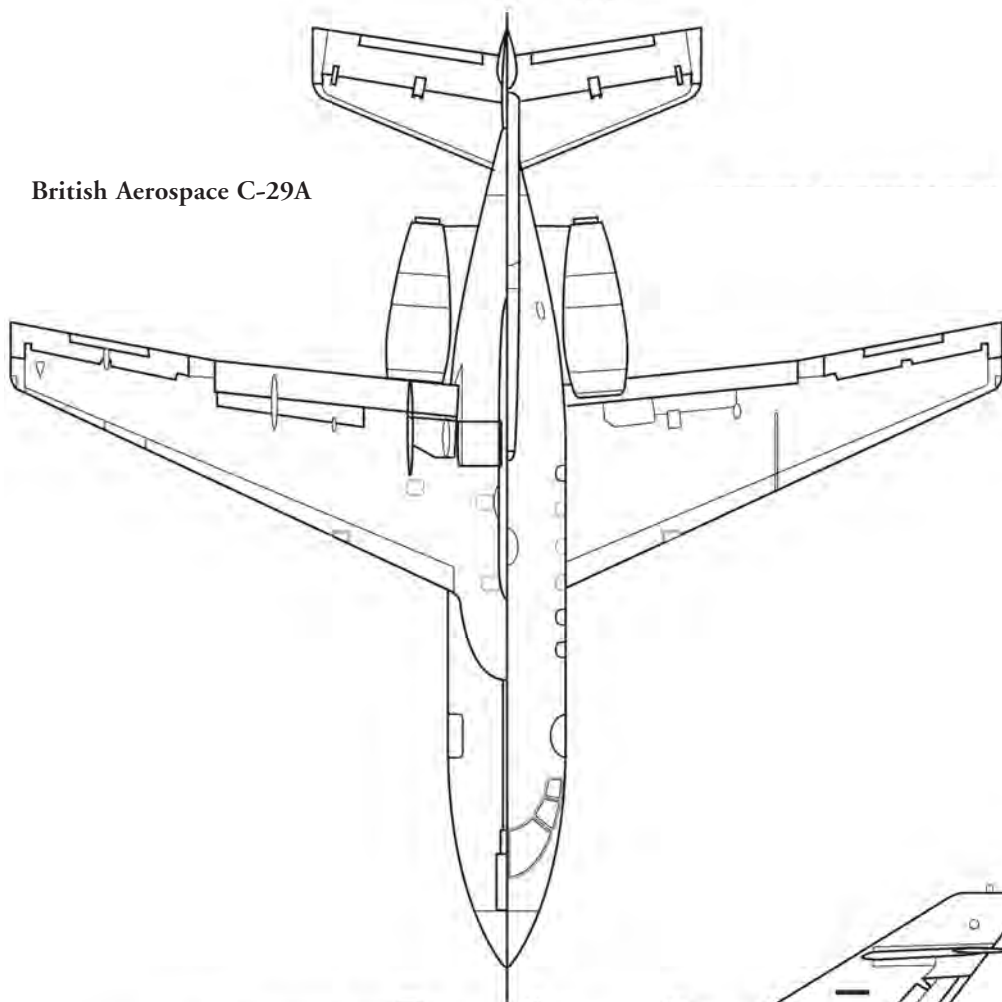
Originally designed and test flown as the De Havilland 125 (1962) and initially produced as the Hawker Siddeley 125 (1963–1977), this aircraft became the BAe 125 following a merger with British Aerospace in 1977. Its basic design is characterized as a swept-wing planform with rear-mounted engines and a high, cruciform tailplane. Over its 48-year production life, it has been offered in eight major versions, and is still manufactured today with final assembly being performed by Hawker Beechcraft in Wichita, Kansas. The most numerous variant, the Series 800 with increased wingspan, a re-contoured nose, a tail fin extension, digital flight displays,



One of the 12 C-29As that entered service with the 1467th Facility Checking Squadron in 1990 and 1991. Painted camouflage for missions into combat zone during Gulf War.



British Aerospace C-29A



and new engines, appeared in 1983. Although designed as a small (8-14-passenger) airliner or corporate jet, the type has been adapted to a variety of military roles. In 1988, under the designation C-29A, the USAF selected the BAe 125 Series 800A (TFE731 engine upgrade) to replace its Lockheed C-140As (see, above) as navigation system check aircraft, and under two contracts for six aircraft each, BAe delivered 12 C-29As to the USAF between 1990 and 1991.

Initially, the C-29As were assigned to the 1467th Facility Checking Squadron at Scott AFB, Illinois. During the Gulf War, painted in camouflage schemes, they flew combat flight inspection and navigation (C-IFN) missions in the combat zone. However, once hostilities ended, the C-29As were turned over to the FAA to perform airways inspection flights out of Will Rogers Airport in Oklahoma City, Oklahoma. Although technically civil aircraft, the C-29As continued to be flown by USAFR aircrews as part of the 1st Aviation Standards Flight, manned by the 507th Air Refueling Wing. None of the C-29As appear on the current USAF inventory and have apparently been replaced in the airways inspection role by Bombardier Challenger 601s.

## C-30 (not assigned)

## Fokker C-31 Troopship — 1985

### Technical Specifications (C-31A)

Type: Light tactical transport.

Manufacturer: Fokker Aircraft Industries, GmbH, Amsterdam, Netherlands.

Total military versions: 2 (U.S. Army).

Capacity: Crew of three plus 56 troops, 24 medical litters, or 12,800 lbs. of cargo.

Powerplants: Two 2,250-shp Rolls-Royce Mk.532-7 *Dart* turboprop engines driving four-bladed Dowty-Rotol fully reversible, constant-speed propellers.

Performance: Max. speed (not reported), cruise 292-mph; ceiling 25,000 ft.; range 1,135 mi.

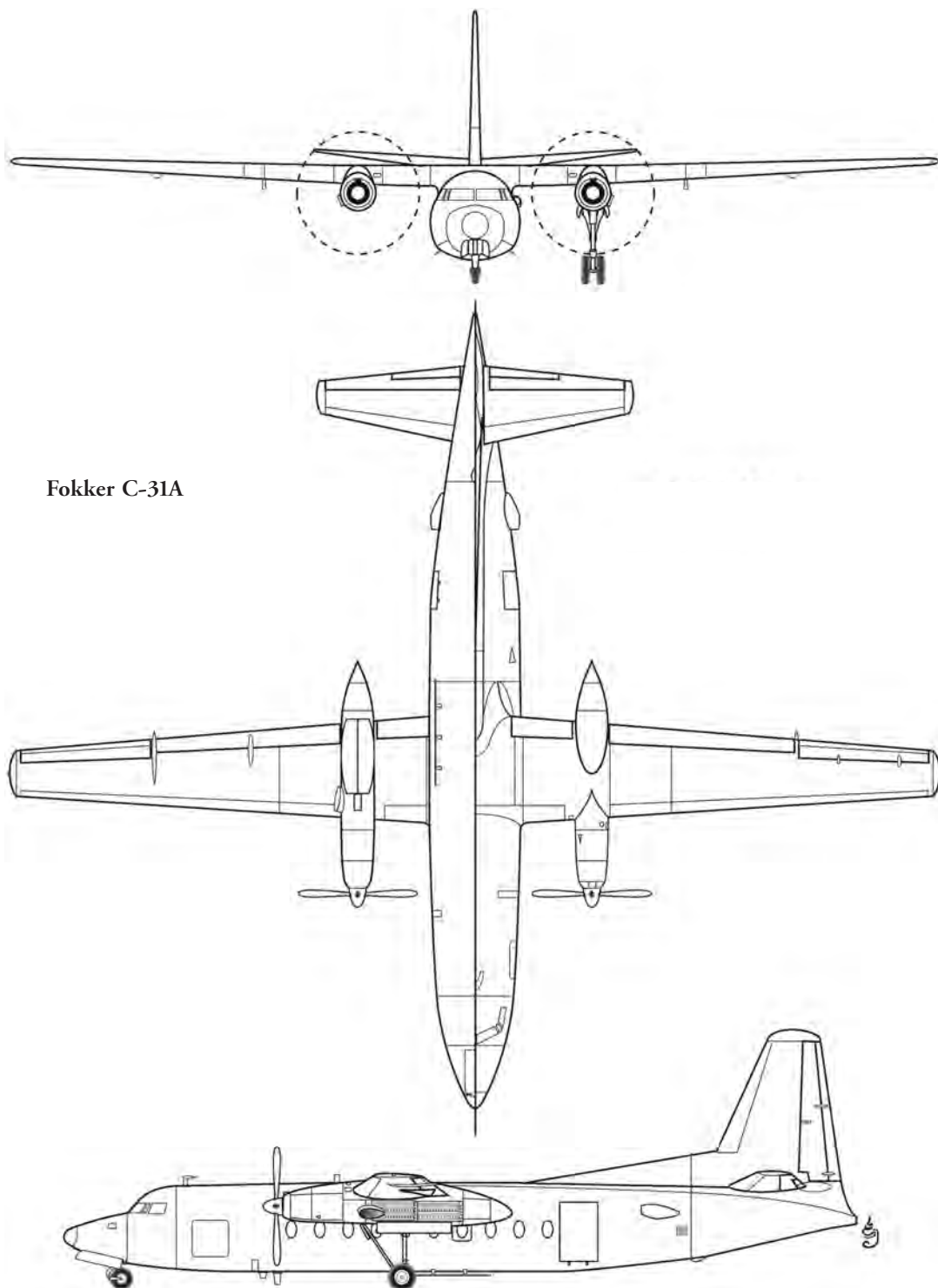
Weights: 22,600 lbs. empty, 40,000 lbs. max. takeoff.

Dimensions: Span 95 ft. 2 in., length 72 ft. 3 in., wing area 754 sq. ft.



One of the two C-31As flown by the Army's Golden Knights parachute demonstration team as seen taking off in 2009. A team spokesman has announced that they may be replaced by DHC-8s.





Fokker C-31A

Appearing as one of the earliest twin-turboprop passenger transports, the Dutch-designed Fokker F27 began entering regular airline service in late 1958, and 586 examples had been delivered when production ceased in 1987. Besides European production, Fairchild also license-manufactured another 207 F27s in the U.S. Billed as “Troopships,” Fokker began offering military variants (F27-300M, -400M, and -500M) during the 1960s which came with side cargo doors and could be configured to carry 56 fully equipped troops, 24 medical litters, or up to 12,000 lbs. of cargo. As replacements for their aging C-7A Caribous, the U.S. Army Parachute Team, the Golden Knights, leased two F27-400Ms from Fokker in December 1985, placing them in service as the C-31A, then purchased them three years later. Trimmed in a distinctive white, gold, and black paint scheme, both aircraft are still operated by the Golden Knights at this writing, however, a spokesman for the team recently announced that they are considering the possibility of replacing them with Bombardier DHC-8s in the next year or two.

## Boeing C-32 —1998

### Technical Specifications (C-32A)

Type: VIP and personnel transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 8 (USAF).

Capacity: Crew of 16 (for VIP) plus 45 passengers or 49,900 lbs. of cargo.

Powerplants: Two Pratt & Whitney PW2040 high-bypass turbofan engines, each rated at 43,730 lbs./s.t.

Performance: Max. cruise speed 530-mpg; ceiling 42,000 ft.; range 6,498 mi.

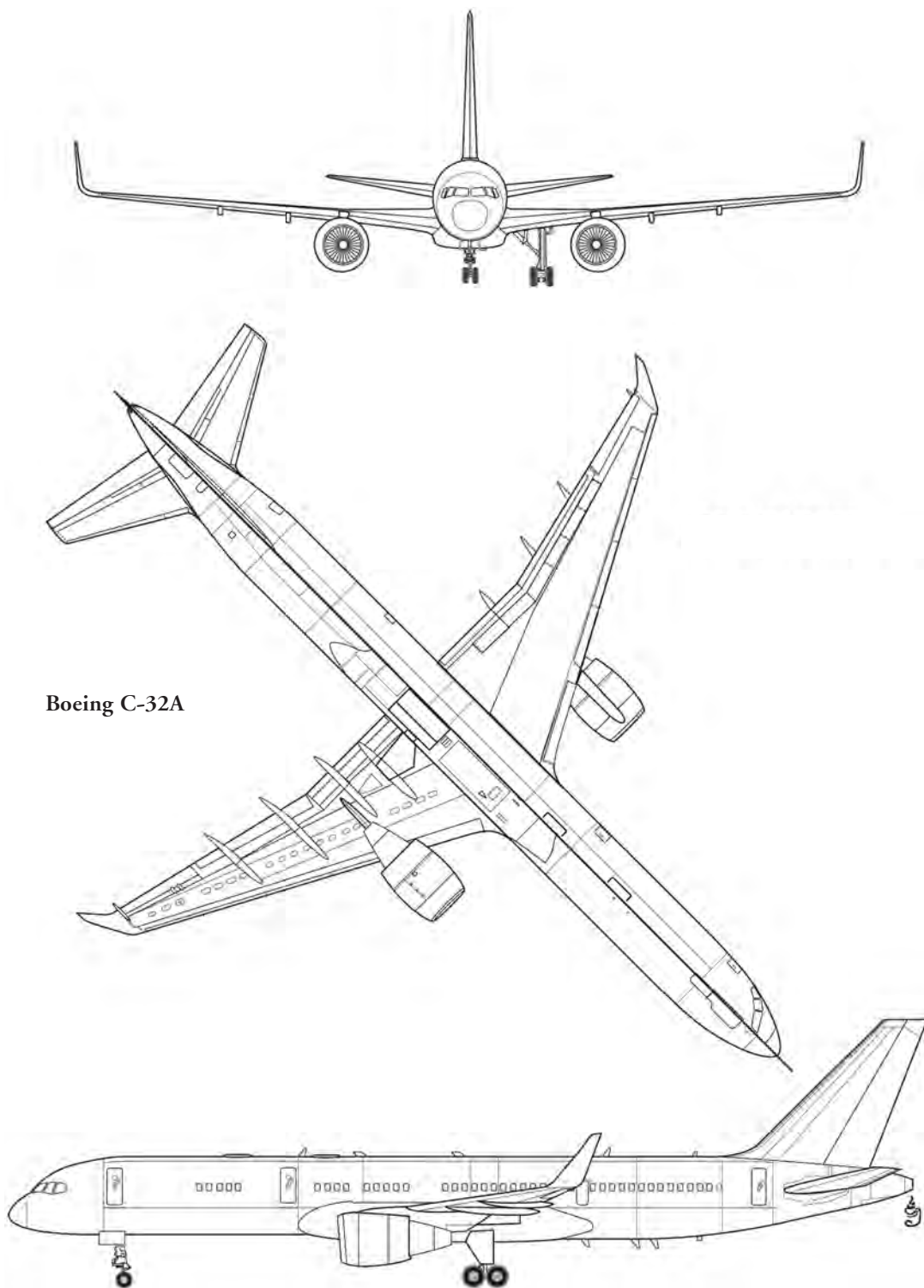
Weights: 127,520 lbs. empty, 255,000 lbs. max. takeoff.

Dimensions: Span 124 ft. 8 in., length 155 ft. 3 in., wing area 1,951 sq. ft.

The Boeing model 757, a narrow-body, twin-engine passenger transport intended as a replacement for the model 727, began entering airline service in 1978 and remained in production until 2004, with 1,050 examples having been delivered. When introduced, the 757's combination of high-bypass turbofan engines and advanced wing design set a new standard in fuel efficiency in terms of speed, range, and payload, plus it could operate from shorter runways (5,000 feet) than older aircraft of comparable weight and capacity. It has been sold in three major versions, the 757-200 (up to 228 passengers in maximum density), the 757-200F (all freight), and the stretched 757-300 (lengthened to 178 feet, eight inches and accommodating up to 289 passengers in maximum density).

In August 1996, in order to replace the Boeing VC-137B/Cs (see above in Series I, Part A) still serving in 89th Airlift Wing's Presidential Flight, the USAF awarded Boeing a contract to deliver four specially configured 757-200s under the military designation C-32A. Compared to the VC-137B/C, the C-32A can travel twice the distance on the same amount of fuel, then operate from shorter runways at its destination. According to specifications issued for the C-32A, the fuselage behind the cockpit was divided into four sections: a forward cabin housing a communications center, galley, lavatory, and 10 business-class seats; a second cabin with a fully enclosed stateroom for the primary passenger; a third cabin with a conference area, staff facilities, and eight business-class seats; and an aft cabin with a second galley, two lavatories, and 32 business-class seats.

As part of the Presidential Flight, the C-32As are earmarked for the use of the Vice-President, the First Lady, Cabinet Members, and other government dignitaries as the situation demands; and occasionally, when used by the President for a short trip, a C-32A may operate under call sign “Air Force One.”



**Boeing C-32A**



**USAF C-32A of 89th Air Wing seen on approach to La Guardia Airport in April 2010 with Vice President Biden aboard. Altogether, six C-32As make up the Presidential Flight.**

Initial deliveries of the first four C-32As to the 89th AW commenced in mid-1998. Two more C-32As, both ex-airline 757-200s later acquired by the USAF, were added to the 89th AW's transport fleet at Andrews AFB, Maryland in 2010. Shortly after the terrorist attack on September 11, 2001, the USAF purchased two ex-airline 757-200s that would be tasked to fly missions for the State Department and the Department of Homeland Security. Designated C-32B, these two aircraft have been equipped with extended fuel cells and are fitted with non-VIP interiors having 48 seats and space for cargo. Both C-32Bs are maintained and operated by the 227th Special Operations Flight out of McGuire AFB, New Jersey.

## C-34 (not assigned)

## Cessna UC-35 (T-37) Citation —1998

### Technical Specifications (UC-35A)

Type: Light staff and logistics transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 43 (27 U.S. Army; 16 USMC).

Capacity: Crew of two plus eight passengers or 1,850 lbs. of cargo.

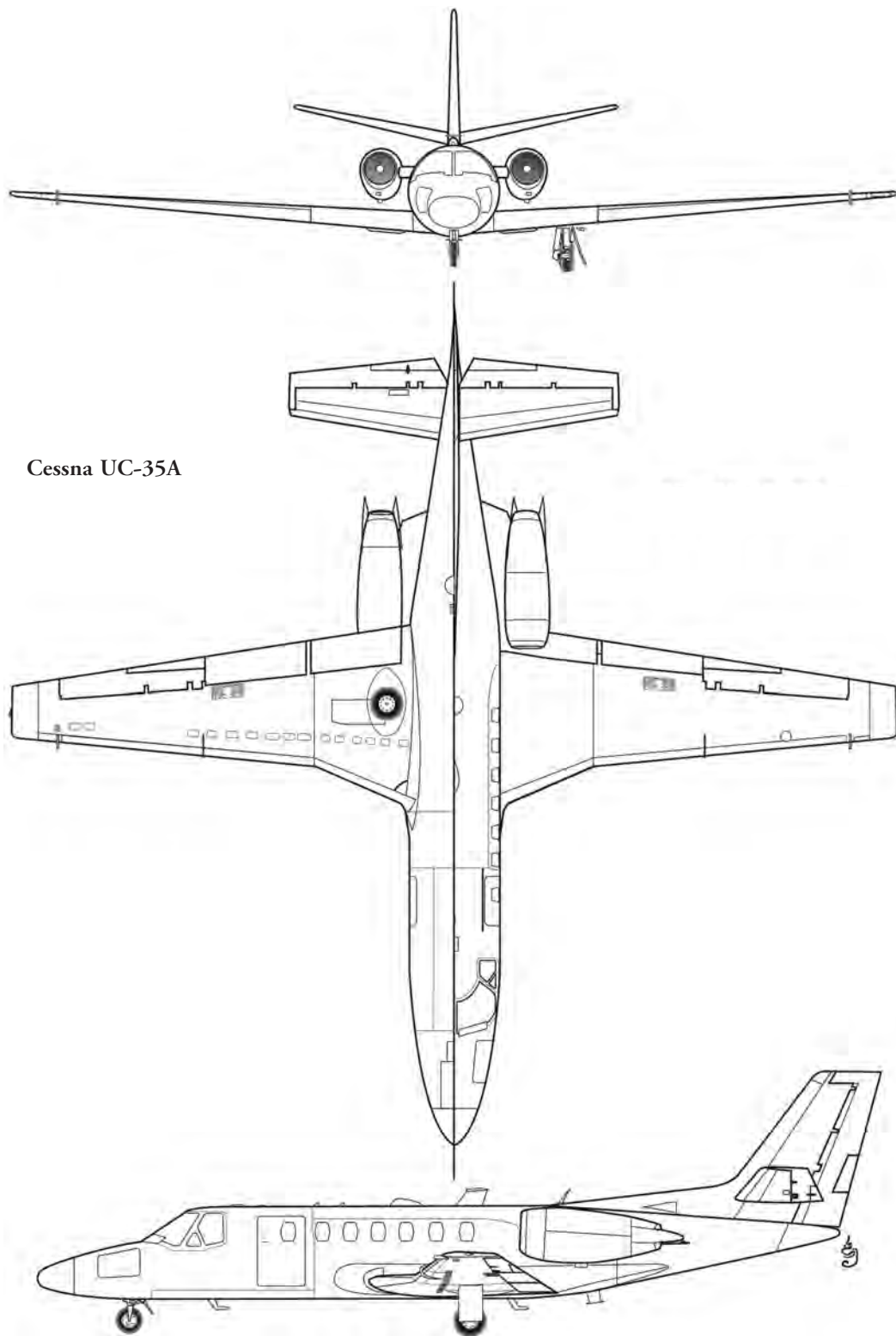
Powerplants: Two Pratt & Whitney JT15D-5D turbofan engines, each rated at 3,045 lbs./s.t.

Performance: Max. cruise 490-mph, normal 430-mph; ceiling 45,000 ft.; range 2,257 mi.

Weights: 9,395 lbs. empty, 16,300 lbs. max. takeoff.

Dimensions: Span 52 ft. 2 in., length 48 ft. 11 in., wing area 322 sq. ft.

Originally flown as the five-passenger FanJet 500 in September 1969, Cessna's long-running series of Citation business jets made their debut on the civil market in 1971. The Citation's straight-wing layout represented a design compromise between the speed of a pure jet versus the ability to operate from the same small airports as light turboprop aircraft (e.g., Beech King Air 90 and Piper Cheyenne) against whom it was intended to compete. Following the initial model 500, a succession of improvements and upgrades over the years resulted in introduction of the Citation I (1976), the stretched, eight-passenger Citation II (1978), the swept-wing Citation



Cessna UC-35A





**A pf 20 UC-35A procured by the U.S. Army in 1998 to fulfill a medium-range, light cargo requirement. These were first Citations to be used as military transports.**

III (1979), and the further refined, straight-wing Citation V (1987). (Note, the proposed Citation IV was never built.) And Cessna has since offered enhanced variants of the Citation V as the Ultra (1993) and Encore (1998), the latter of which is still being produced.

Cessna loaned a Citation 500 demonstrator to the Coast Guard during 1973 to be evaluated as a potential search and rescue platform, but none were purchased. The first actual military variants appeared in the late 1983 when the Navy procured 15 Citation IIs specially equipped as F-14 radar intercept officer trainers under the designation T-47A. No military transport variants emerged until 1998, when, to fulfill a medium-range, light cargo aircraft requirement (i.e., C-XX [MR]), the Army contracted for the first of 20 off-the-shelf Citation Ultras which were delivered over a two-year interval under the designation UC-35A; then in 1999, two essentially identical Ultras entered service with the Marine Corps as the UC-35C. In addition to more powerful -5D engines and increased fuel capacity, Ultras were the first Citation variants to offer digital flight displays (“glass cockpits”) and Global Air Traffic Management (GATM) avionics systems. Why the “B” suffix was applied out of order is not made clear, however, seven Citation Encores ordered by the Army in 2000 entered service as the UC-35B, and since 2001, new Marine Corps orders have accounted for delivery of 13 more as the UC-35D. Improvements to the Encore included a two-foot addition to wingspan, revised main landing gear, bleed-air system for anti-ice and boundary layer control, and Pratt & Whitney PW535A engines that boost takeoff, climb, and cruise performance by a factor of 12 percent.

As Army UC-35As became operational during the late 1990s, some formed the FORSCOM Jet Training Detachment for Army Reserve and Guard pilots, some were distributed among Army Reserve aviation companies to serve as a regional network for transporting personnel and high-value cargos, and others went to Army Operational Support Airlift Agency, which is controlled by the Army National Guard. Serving alongside the larger C-12C/Ds, the UC-35As can operate from the same airfields and carry personnel to and from locations not served by large civilian airports. Most recently, deliveries of newer UC-35Bs have been divided between Army Reserve units and the U.S. Army Priority Air Transport (USAPAT) at Andrews AFB, Maryland,



**One of 13 Citation Encores accepted by the Marines from 2001 to 2006 as the UC-35D. The aircraft were distributed among detachments at MCAS Miramar, California, NAS New Orleans, Louisiana, and MCAS Futenma, Okinawa.**

where they augment existing C-20s and C-37s on shorter routes. Marine Corps UC-35C/Ds have all been distributed among Operational Support Airlift detachments at MCAS Miramar, California, NAS (JRB) New Orleans, Louisiana, and MCAS Futenma, Okinawa.

### **C-36 (reserved for USAF but not used)**

## **IAI/Galaxy Aerospace C-38 Courier —1998**

#### **Technical Specifications (C-38A)**

Type: Light staff and logistics transport.

Manufacturer: Israeli Aerospace Industries, Ltd./Galaxy (Gulfstream Aerospace after 2001), Lod, Israel.

Total military versions: 2 (ANG).

Capacity: Crew of two plus six to nine passengers or 3,291 lbs. of cargo.

Powerplants: Two Honeywell TFE731-49R-700G turbofan engines, each rated at 4,250 lbs./s.t.

Performance: Max. speed 543-mph, cruise 529-mph; ceiling 45,000 ft.; range 2,950 mi.

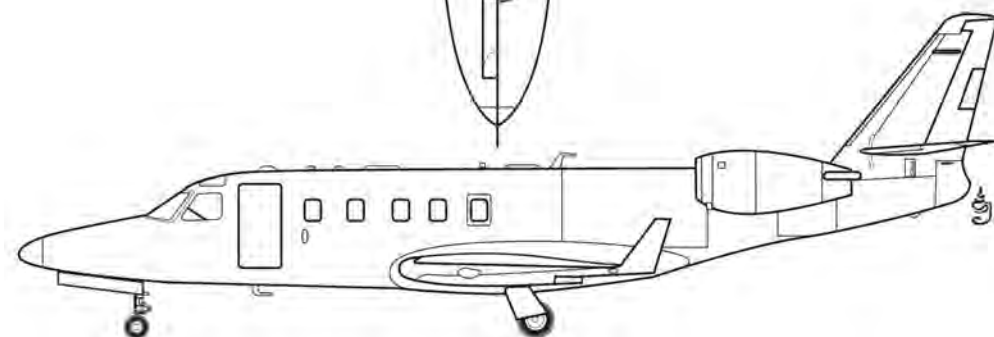
Weights: 14,400 lbs. empty, 24,800 lbs. max. takeoff.

Dimensions: Span 54 ft. 7 in., length 55 ft. 7 in., wing area 317 sq. ft.

The origins of the C-38 can be traced all the way back to the Aero Commander 1121 Jet Commander of 1963, itself a progressive development of Aero Commander's piston-engine 500 series. In 1968, after Aero Commander's merger with North American–Rockwell, production



IAI/Galaxy Aerospace C-38A





**One of two C-38As serving with the 201st Airlift Squadron, District of Columbia ANG, seen in July 2008 at the RAF base in Fairford, England. Both operate out of Andrews AFB, Maryland (courtesy Olivier Gregoire).**

rights to the 1121, plus the as yet un-built 1122 design, were sold to Israeli Aircraft Industries (IAI), who subsequently offered enhanced versions as the Westwind 1123, 1124, and 1124A. Further improvements in the form of an all-new swept wing and substantially redesigned fuselage resulted in introduction of the 1125 Astra in 1984, which was followed in production by the upgraded Astra SP in 1989 and Astra SPX in 1994. In 2002, after Gulfstream acquired design rights to the Astra SPX, it was renamed the G100, although the airframes are still being built in Israel.

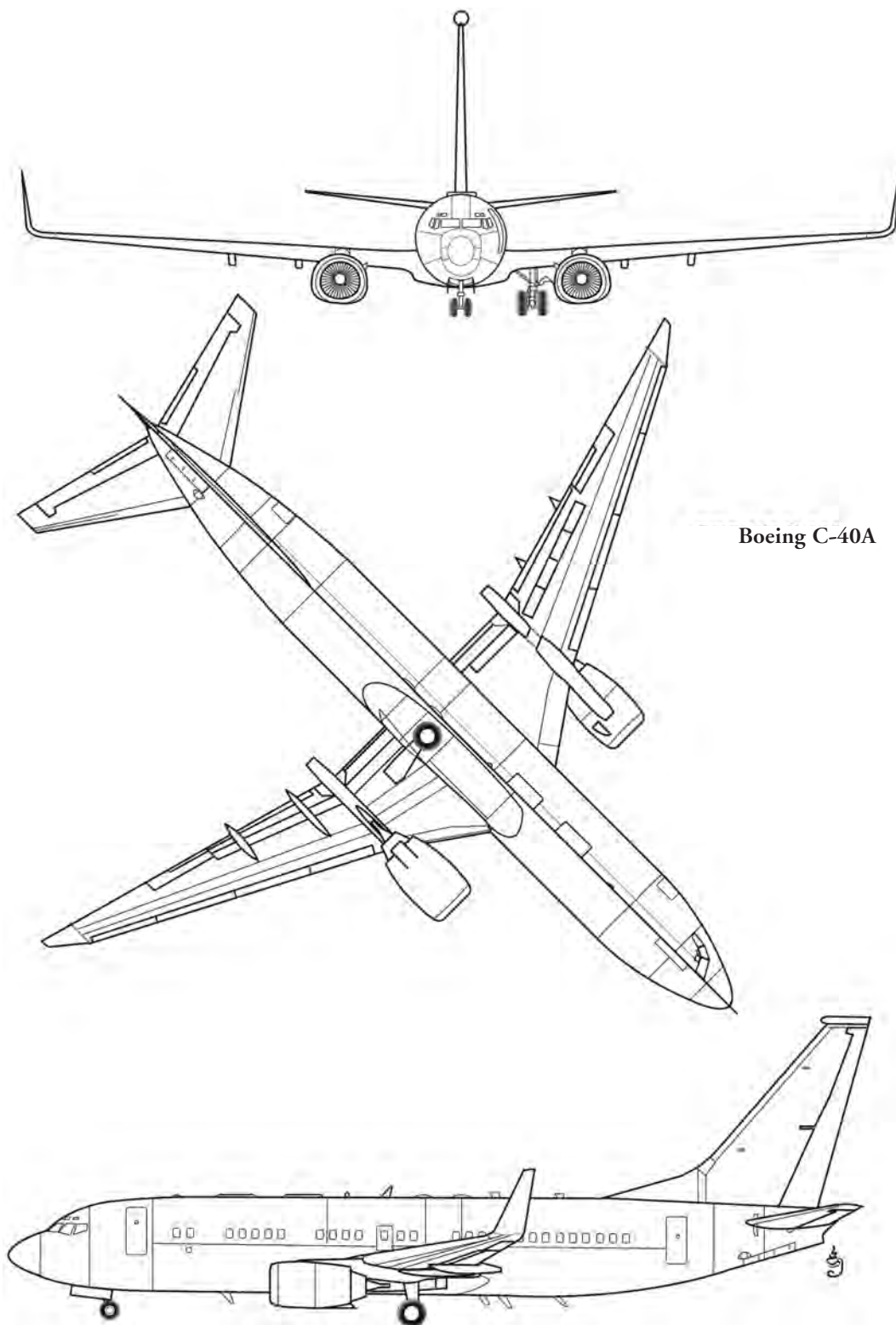
The USAF ordered two Astra SPXs from IAI in 1997 for the express purpose of replacing two Lear C-21As then serving with the 201st Airlift Squadron of the District of Columbia ANG. Both aircraft were delivered during 1998 under the assigned designation C-38A and name Courier. The C-38A had been selected to replace the C-21As because it offered more range and cabin space at approximately the same operating efficiencies. Based at Andrews AFB, Maryland, the C-38As of the 201st Airlift Squadron are flown by ANG aircrews in partnership with the 89th Airlift Wing to provide worldwide air transportation to the Executive Branch, U.S. Congress, Department of Defense, and other high-ranking government officials.

### **C-39 (reserved for Navy but not used)**

## **Boeing C-40 Clipper (T/CT-43) — 2001**

### **Technical Specifications (C-40A)**

Type: Intermediate range personnel and logistics transport.  
Manufacturer: Boeing Aircraft Co., Seattle, Washington.



**Boeing C-40A**



Total military versions: 21 (10 USAF; 11 USN).

Capacity: Crew of five plus 121 passengers or 40,000 lbs. of cargo.

Powerplants: Two CFM International CFM56-7SLST turbofan engines, each rated at 27,300 lbs./s.t.

Performance: Max. speed 544-mph, cruise 511-mph; ceiling 41,000 ft.; range 3,510 mi.

Weights: 84,200 lbs. empty, 171,000 lbs. max. takeoff.

Dimensions: Span 117 ft. 5 in., length 110 ft. 4 in., wing area 1,341 sq. ft.

The Boeing model 737 series, in continuous production since 1967, is the best selling type of jet airliner in the history of aviation, with 6,919 aircraft having been delivered at the date of this writing. So many different variants have been produced that they are divided into two broad groups: the 737 Original and Classic, which includes the 737-100 and -200 (1967), 737-300 (1984), 737-400 (1988), and 737-500 (1989); and the 737 Next Generation, which includes the 737-600, -700, and -800 (1998) and the 737-900 (2001). The first military variants appeared in 1973 following USAF procurement of 19 model 737-200s that were specially configured as navigator trainers under designation T-43A. After release from training duties, several T-43As were modified to serve as personnel and cargo transports as the CT-43A, with the last example being withdrawn in 2001. Of historical note, a CT-43A assigned to the 435th Airlift Wing crashed with no survivors in Croatia in 1996 while carrying Secretary of Commerce Ron Brown and 34 other passengers.

During the late 1990s, with the aim of replacing its older fleet of C-9Bs (see above), the Navy gave Boeing a series of contracts for 11 off-the-shelf 737-700s under the designation C-40A Clipper, with slow-rate deliveries taking place over a 10-year interval between 2001 and 2011, and deliveries are expected to continue up to a total force of 17 aircraft. Navy C-40As have been completed with “combi” interiors allowing them to be configured for either 121-passengers,



Navy C-40A of reserve squadron VR-58 based at NAS Jacksonville, Florida, seen on ground at Palawan, Philippines, during naval exercises held in 2004.

a combination of three cargo pallets and 70-passengers, or all-cargo. The USAF became a 737-700 user when it ordered four aircraft with custom interiors that were delivered from 2002 to 2004 as the C-40B. Besides being equipped with an executive communications suite, the main cabin of the C-40B includes a crew rest area, a distinguished visitor compartment with sleeping accommodations, two galleys, and business-class seating with worktables. Within a similar time-frame, the USAF also contracted for six off-the-shelf 737-700s with combi-type interiors that were delivered between 2002 and 2007 as the C-40C. Depending upon the mission to be flown, the interior of a C-40C may be variously rigged for 111-passengers or a combination of 44-passengers and cargo pallets.

All Navy C-40As are operated and maintained by Naval Reserve units. Since 2001, three have been delivered to VR-59, a Fleet Logistics Support Squadron based at NAS (JRB) Ft. Worth, Texas; three to VR-58 at NAS Jacksonville, Florida; and three to VR-57 at NAS North Island, California. Two more C-40As were slated for delivery in 2010 and 2011, however, their unit assignments have yet to be publicized. Since being delivered from 2002 to 2004, USAF C-40Bs have replaced aging VC-137B/Cs as transports for USAF combat commanders and are operated by the following units: the 89th Airlift Wing at Andrews AFB, Maryland (Air Combat Command); the 15th Airlift Wing at Hickam AFB, Hawaii (Pacific Air Forces); and the 86th Airlift Wing at Ramstein AB, Germany (USAFE). Intended to replace older C-22Bs and the single C-22C, the six C-40Cs delivered to the USAF between 2002 and 2007 are used by the National Guard Bureau to airlift personnel and cargo and are currently operated by the 201st Airlift Wing (D.C. ANG) at Andrews AFB and the 932nd Airlift Wing (USAFR) at Scott AFB, Illinois.

## CASA C-41 Aviocar—1990

### Technical Specifications (C-41A)

Type: Light STOL tactical transport.

Manufacturer: Construcciones Aeronáuticas, SA. (CASA), Seville, Spain.

Total military versions: 4 (2 USAF; 2 U.S. Army).

Capacity: Crew of two plus 24 troops or 5,952 lbs. of cargo.

Powerplants: Two 900-shp Garrett (Honeywell) TPE331-10R-513C turboprop engines driving four-bladed Hartzell fully reversible, constant-speed propellers.

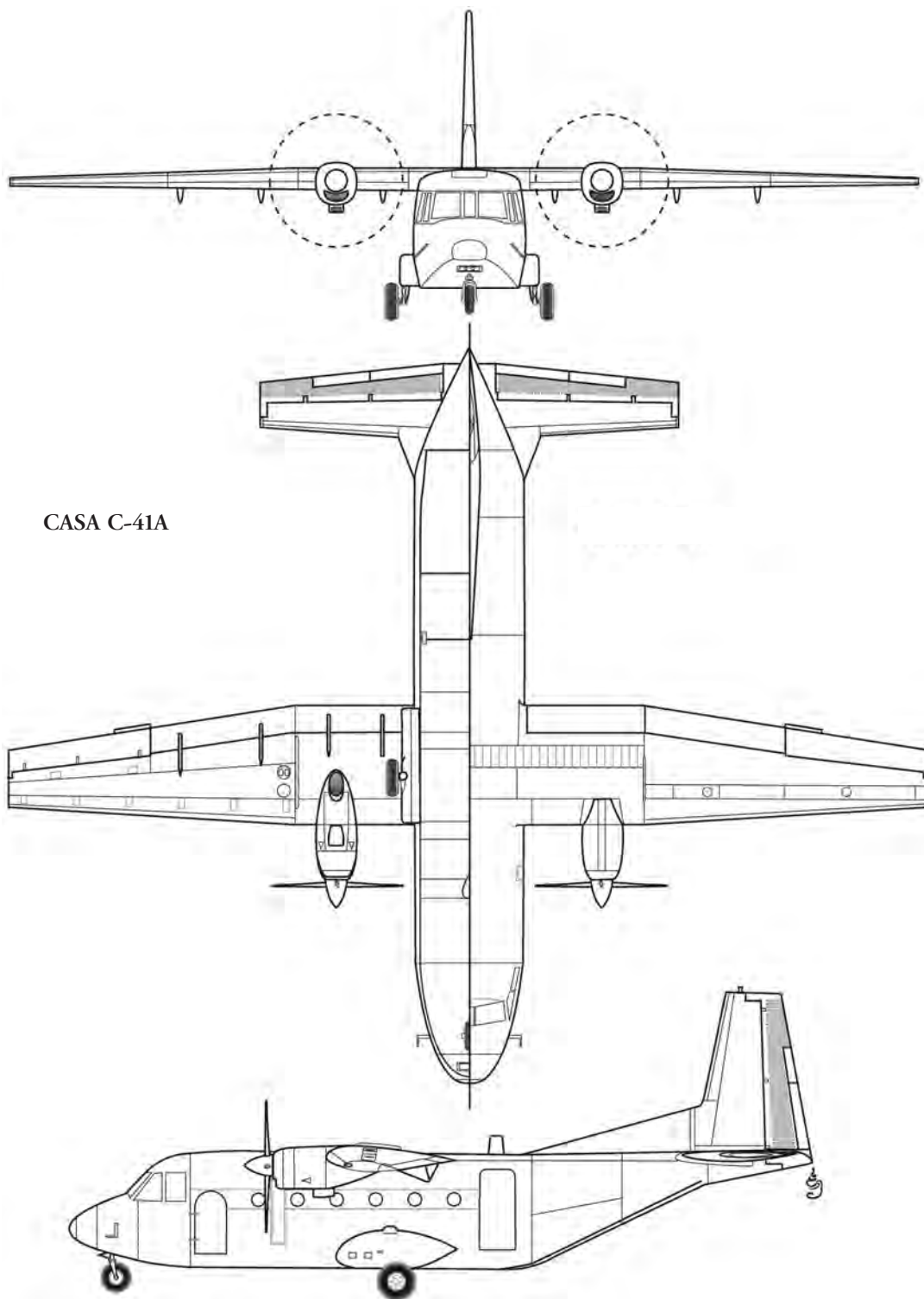
Performance: Max. speed 230-mph, cruise 186-mph; ceiling 26,000 ft.; range 1,125 mi.

Weights: 8,333 lbs. empty, 16,975 lbs. max. takeoff.

Dimensions: Span 66 ft. 7 in., length 53 ft. 2 in., wing area 441 sq. ft.

Conceived and built in Spain to be marketed as either a short-haul airliner or small STOL tactical transport, the CASA C-212 Aviocar made its first flight in 1971 and began entering service with the Spanish Air Force in 1974. Being presented as a simple and relatively inexpensive alternative to obsolescent World War II-era transports like the C-47 and Ju52, the unpressurized C-212 combined the high-wing, rear-loading layout and turboprop efficiency of a modern tactical transport with the ability to operate from short, unimproved airstrips. Following the original C-212, CASA introduced the C-212-200 in 1979 with a fuselage stretch and new Garrett engines, the C-212-300 in 1987 with improved aerodynamics, new avionics, and an enlarged nose, and the C-212-400 in 1997 with ungraded engines and digital avionics.

The record of C-212 procurement by the U.S. military is somewhat confusing. Serial number assignment records indicate that two ex-civil C-212-200s were acquired by the Army in 1990 (ser. nos. 90-0168/0169) without any assigned designation and initially operated from AAF Laguna near Yuma, Arizona. The same record, in the same year, lists two more C-212s (ser. nos.



CASA C-41A



**USAF C-212 shown in 1993 before the C-41A military designation had been applied. Two C-41As are thought to be operating with the 427th Special Operations Squadron at Pope AFB, North Carolina.**

90-0177/0178) on the government inventory, one of which may have been a C-212-300; however no mention is made to which service they were assigned or where they were based. In any event, two C-212-200s (tail nos. 70159 and 00169 according to recent photos) appear on the current USAF inventory under the designation C-41A. Both are thought to be in service with the 427th Special Operations Squadron operating out of Pope AFB, North Carolina.

**C-42, C-43, and C-44 (not assigned)**

**C-45 (reserved for Northrop-Grumman/  
Airbus KC-45A but not used)**

## **Boeing KC-46 — 2015**

### **Technical Specifications (KC-46A)**

Type: Aerial refueling tanker and long-range logistical transport.

Manufacturer: Boeing Aircraft Co., Seattle, Washington.

Total military versions: 18 projected thus far (USAF).

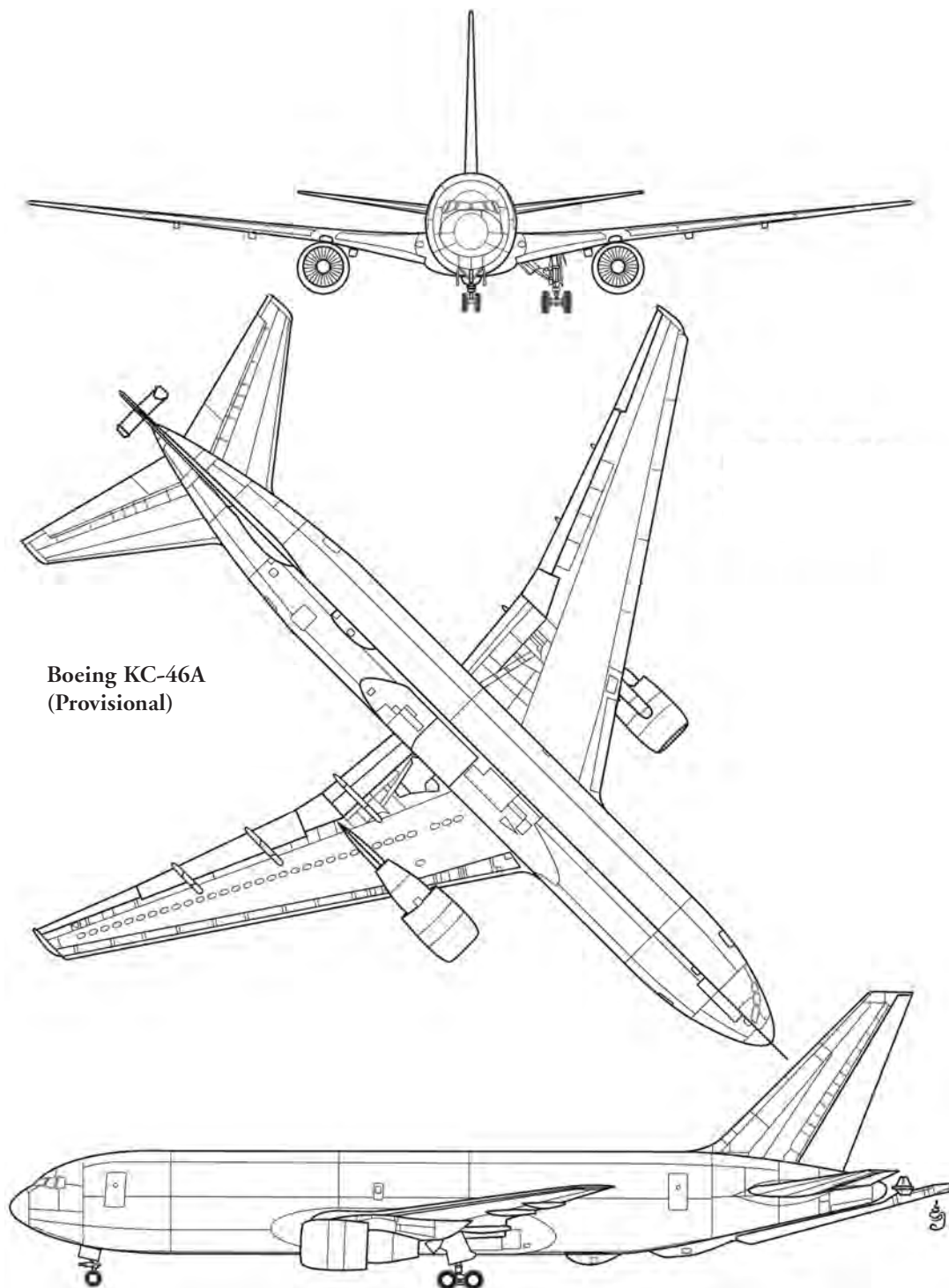
Capacity: Crew of three plus 114 passengers, 24 medical litters, or 65,000 lbs. of cargo.

Powerplants: Two Pratt & Whitney PW4062 high-bypass turbofan engines, each rated at 63,300 lbs./s.t.

Performance: Max. speed 570-mph, cruise 530-mph; ceiling 40,100 ft.; range 7,343 mi.

Weights: 181,610 lbs. empty, 415,000 lbs. max. takeoff.

Dimensions: Span 157 ft. 8 in., length 165 ft. 6 in., wing area 3,050 sq. ft.



**Boeing KC-46A**  
(Provisional)





**KC-767 demonstrator undergoing USAF evaluations at McConnell AFB, Kansas, in early 2010. KC-46A deliveries to the USAF are scheduled to start in 2015.**

The Boeing model 767, a mid-sized, wide-body passenger transport, began entering commercial airline service in 1982. With primary design emphasis on fuel efficiency, it was the first wide-body of American design to feature a twin-engine layout and also the first to have a two-crew glass cockpit. Like Boeing's preceding model 757 (see C-32 above), the combination of wing-mounted high-bypass turbofans with a state-of-the-art supercritical wing enabled the 767 to achieve unparalleled fuel efficiency for an aircraft of its size. To date, Boeing has delivered over 1,000 767s in three major variants that include the initial 200 series; the 300 series introduced in 1986 with a 21-foot fuselage stretch and the 400 series introduced in 2000 with a 42-foot fuselage stretch and 24-foot increase in wingspan. Production continues with 57 orders outstanding.

No military interest in the 767 arose until the early 2000s, when the USAF asked Boeing to propose a cargo-tanker derivative of the 767-200ER (extended range) as replacements for the oldest KC-135s still in service. In 2002, under the provisional designation KC-767, the USAF requested approval to lease 100 of the new cargo-tankers, but after stringent U.S. Senate objections, revised its request to purchase 80 aircraft outright and lease the other 20. Then in late 2003, amid claims of government corruption, the Department of Defense (DOD) placed the project on hold. No official action resumed until 2006, when the USAF issued a request for proposals under a new program termed tanker-cargo-experimental (KC-X). Over a convoluted process extending over the next five years, the USAF considered several different KC-X proposals: the European-built Northrop Grumman/EADS KC-30, based on the Airbus A330 and subsequently designated KC-45A; the Ukrainian-built Antonov AN-112KC, a pure-jet derivative of the An-70; and from Boeing, a revised KC-767 bid that would combine a 767-200LRF (long-range freighter) fuselage, a -300F wing, landing gear, cargo door, and cargo floor, a -400ER digital cockpit, flaps, and engines, together with a sixth-generation fly-by-wire refueling boom system. Finally, in February 2011, the USAF announced selection of the KC-767, billed as the "NewGen Tanker," as winner of KC-X under the designation KC-46A.

While KC-X selection was still undecided, Boeing received foreign orders for seven KC-767s (based on the 767-200ER), three of which were delivered to the Japanese Self-Defense Force in 2008 and 2009, plus two (of four ordered) to the Italian Air force in 2011. According to Boeing's website (see [http://www.boeing.com/Features/2011/02/bds\\_tanker\\_announcement\\_02\\_24\\_11.html](http://www.boeing.com/Features/2011/02/bds_tanker_announcement_02_24_11.html)), the company has thus far received 18 firm USAF orders for the KC-46A, with potential future orders for 161 more. Initial KC-46A deliveries are scheduled to commence in 2015. Like the KC-10A, the KC-46A will be a dual role aircraft, capable of handling 18 cargo pallets, 58 to 144 passengers depending on cargo mix, or 58 medical evacuees (24 litters/34 ambulatory) in an aeromedical configuration.

## Bombardier C-143 – 2005

### Technical Specifications (C-143A)

Type: Search and rescue command and control transport.

Manufacturer: Bombardier Aerospace Div. of Bombardier, Inc., Montreal, Canada.

Total military versions: 1 (USCG).

Capacity: Crew of four plus 11 passengers or 16,300 lbs. of cargo.

Powerplants: Two General Electric CF34-3A turbofan engines, each rated at 9,140 lbs./s.t.

Performance: Max. speed 548-mph, cruise 529-mph; ceiling 41,100 ft.; range 3,871 mi.

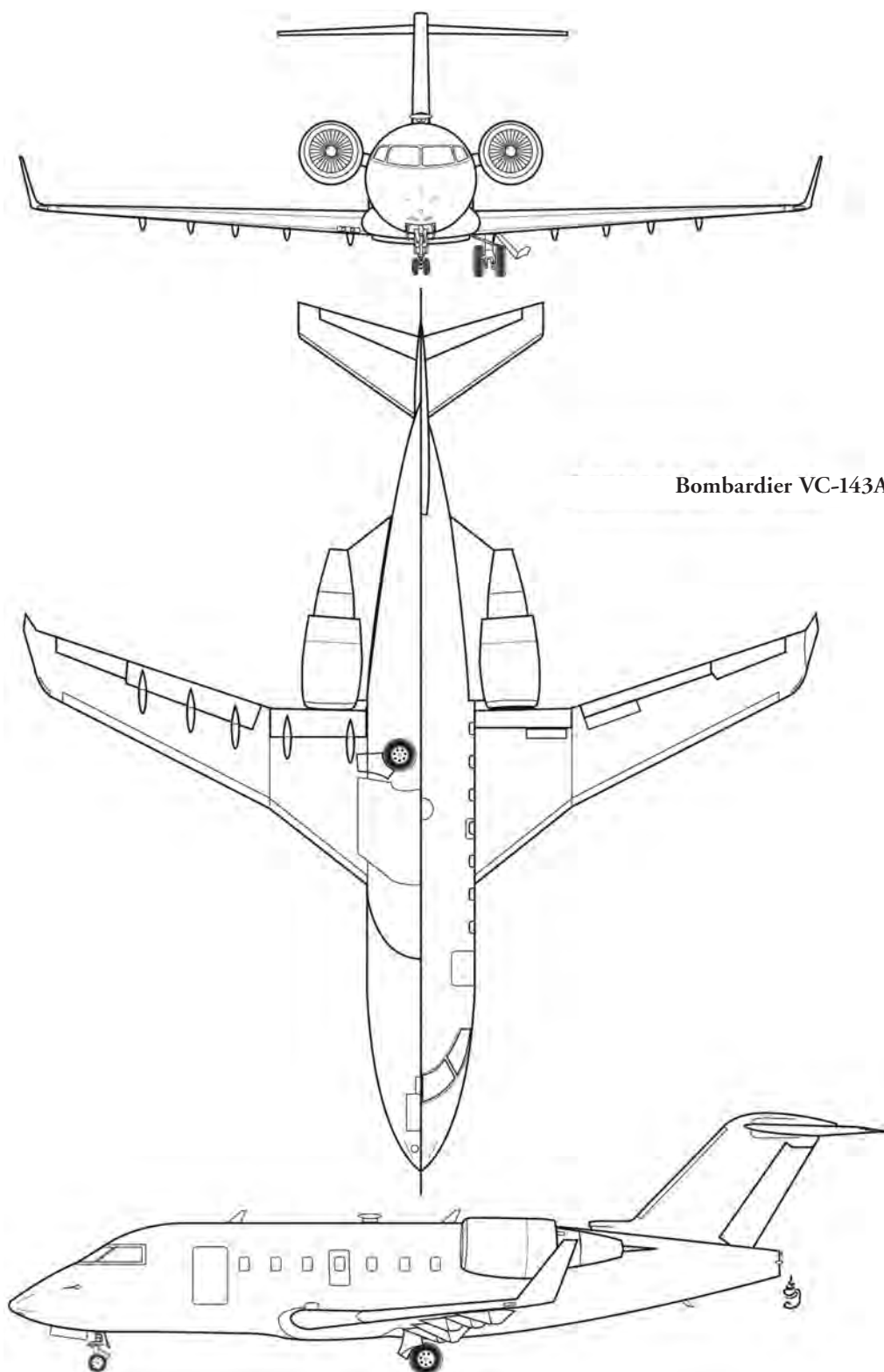
Weights: 20,485 lbs. empty, 43,100 lbs. max. takeoff.

Dimensions: Span 64 ft. 4 in., length 68 ft. 5 in., wing area 520 sq. ft.

Produced by Canadair until acquired by Bombardier in 1986, the concept for the Challenger family of business jets actually originated as the Bill Lear-designed Learstar 600 in 1976. Although sharing some similarities with Learjets, the Challenger CL-600 came with a far more spacious cabin and when flown for the first time in 1978, was one of the first business jet designs having



Coast Guard VC-143A on lease from Bombardier Aerospace seen in 2005 making a final approach into Ronald Reagan Washington National Airport.



**Bombardier VC-143A**

a supercritical wing. The Royal Canadian Air Force was the earliest military customer, purchasing 12 CL-600s in 1983 (CC-144, CE-144, and CX-144) and four CL-601s, the first version to incorporate winglets, during the late 1980s (CC-144B). A major upgrade to the Challenger line appeared in 1994 with introduction of the CL-604, featuring more powerful engines, increased fuel capacity, new landing gear for higher takeoff weights, strengthened wings and tail group, and new Collins ProLine digital avionics.

The Coast Guard leased a new CL-604 from Bombardier in 2005 under the assigned designation C-143A. Revival of the pre-1962 series that ended with the LTV CX-142A (see Series I, Part A, above) has not been officially explained but was apparently due to some confusion within the Department of Defense over the availability of C-42. Described as a medium-range command and control aircraft (MRCCA), the C-143A is equipped with a sophisticated communications suite that enables it to function as an airborne headquarters for the Commandant and other high-level Coast Guard Staff. The aircraft is currently stationed at Andrews AFB, Maryland.

## **Airtech/EADS-CASA CN-235 and C-144 Ocean Sentry —1996**

### **Technical Specifications (HC-144A)**

Type: Light tactical and maritime surveillance transport.

Manufacturer: CN-235: Airtech, a joint venture between CASA (Spain) and IPTN (Indonesia); HC-144A: Construcciones Aeronáuticas, SA. (CASA) Div., European Aeronautic Defence and Space Co. (EADS), Seville, Spain.

Total military versions: 16 (2 USAF; 2 U.S. Army; 12 USCG).

Capacity: Crew of two plus 44 passengers/troops or 13,120 lbs. of cargo.

Powerplants: Two 1,870-shp General Electric CT7-9C3 turboprop engines driving four-bladed Hamilton Sunstrand fully reversible, constant-speed propellers.

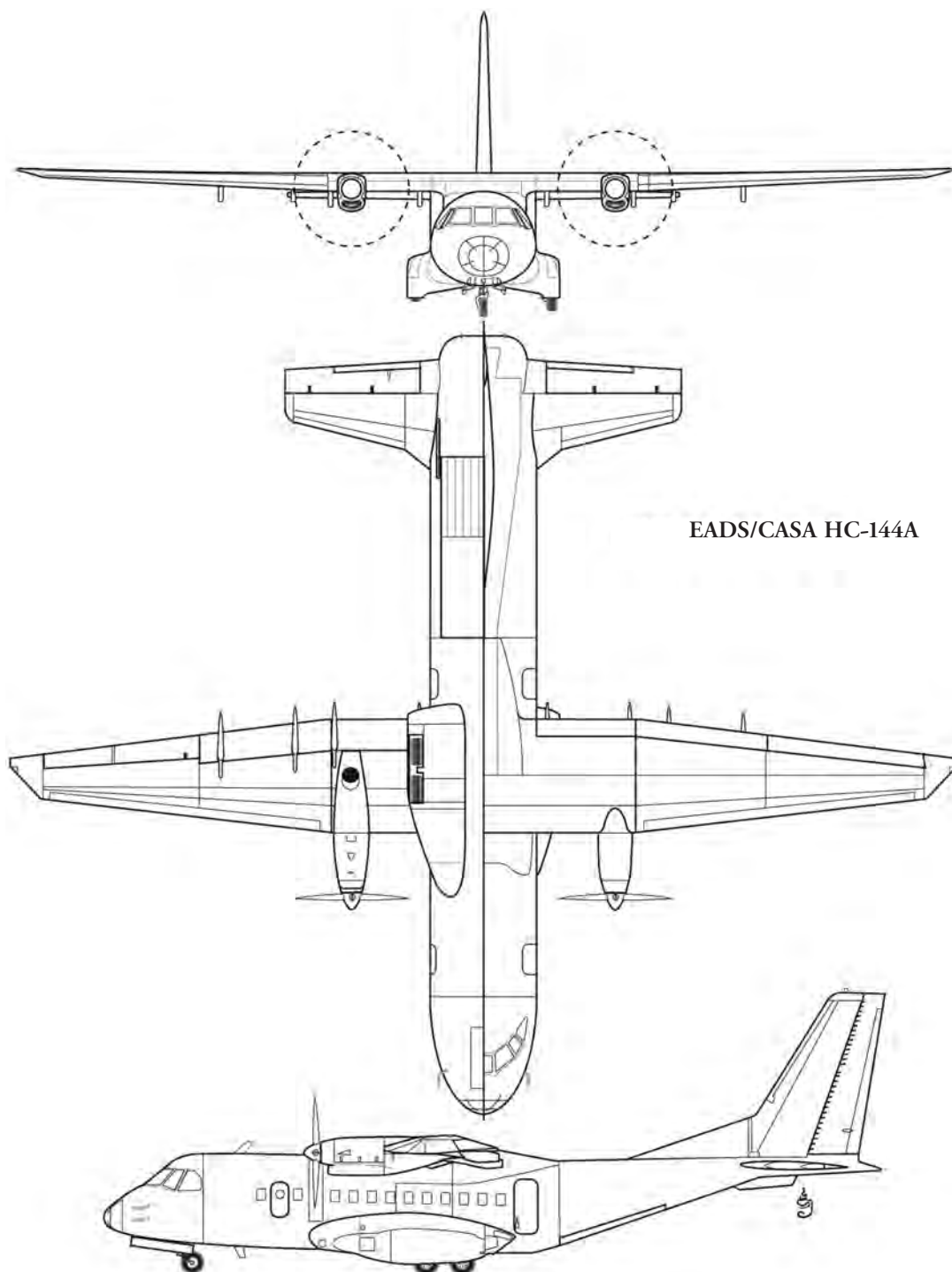
Performance: Max. cruise speed 272-mph; ceiling 25,000 ft.; range 1,801 mi.

Weights: 21,605 lbs. empty, 36,380 lbs. max. takeoff.

Dimensions: Span 84 ft. 8 in., length 70 ft. 2 in., wing area 636 sq. ft.

In 1980, following on the success of the C-212 (see C-41, above), CASA entered into a joint venture (called Airtech) with Indonesia-based IPTN to develop and produce a new type of transport for international civil and military markets. When flown for the first time in late 1983, the CN-235 emerged as a fully pressurized design that could lift three times the C-212's payload and carry it 50 percent further. Since entering production in 1986, over 230 CN-235s have been sold worldwide to both military and civil users, and in 1999, CASA's Spain-based manufacturing facilities became part of the multi-national European Aeronautic Defense and Space Company (EADS) where the type remains in production as the CN235-300. Serial number records indicate the USAF acquired two CN-235-200s in 1996 (serial nos. 96-6046/6049), with no assigned military designation. The 2011 inventory lists 96-6049 as currently active with the 427th Special Operations Squadron at Pope AFB in North Carolina. One unverified source suggests the aircraft is being used to support CIA operations in the Middle East.

In the early 2000s, the Coast Guard selected a specialized variant of the CN-235-300 to replace its aging fleet of Dassault/Falcon Jet HU-25s (see in Series III, below) in the maritime surveillance and interdiction role, with a long-term plan to procure as many as 36 aircraft. Due to apparent confusion over designation availability, as with the C-143A, the aircraft was designated under the old series as the HC-144A. Known as the Ocean Sentry, the Coast Guard received the first aircraft for service trials in December 2006, and it was declared fully operational



EADS/CASA HC-144A





**First Coast Guard HC-144A during acceptance trials in late 2006. Since that time, 12 more examples have entered operational service.**

in April 2009. While slower than the pure-jet HU-25 it replaces, the Ocean Sentry nonetheless possesses over twice the over-water endurance and far more overall mission versatility. For its surveillance mission, which includes drug interdiction, environmental protection, search and rescue, ice patrols, and on-scene command and control, the HC-144A is equipped with infrared and radar search systems and can be loaded with a mission system pallet (MSP) containing an electronics suite for classified and unclassified communications. Without the pallet, it can be used to transport personnel and cargo and to drop rescue equipment such as rafts, pumps, and flares. As of mid-2011, the Coast Guard has accepted a total of 12 HC-144As for service.

## SERIES III

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# Utility and Miscellaneous Transports Since 1962

### Note on Scope of Series

The following series includes any aircraft — regardless of previous designation — which received a “U” for Utility or “V” for Staff Transport designation under the 1962 Tri-Service Designation system. The headings show the pre-1962 designations in parentheses. The series also encompasses a small number of transports that never received any type of U.S. Department of Defense designation, even though in some cases they received a military serial number. Not included are many of the pre-1962 “L” for Liaison types such as the Vultee L-1, Taylorcraft L-2, Aeronca L-3, Piper L-4, Interstate L-6 and -8, Universal (Monocoupe) L-7, Stinson L-9, Ryan L-10, Bellanca L-11, Convair L-13, Piper L-14 and -18, Boeing L-15, Aeronca L-16, and Cessna L-19. Although liaison types were sometimes used to transport staff and medical cases, their primary function remained artillery spotting and tactical observation.

### De Havilland U-1 (UC) Otter — 1953

#### Technical Specifications (U-1A)

Type: Light STOL utility transport.

Manufacturer: De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada.

Total military versions: 203 (184 U.S. Army; 9 USAF; 10 USN).

Capacity: Crew of two plus nine troops, six medical litters, or 2,100 lbs. of cargo.

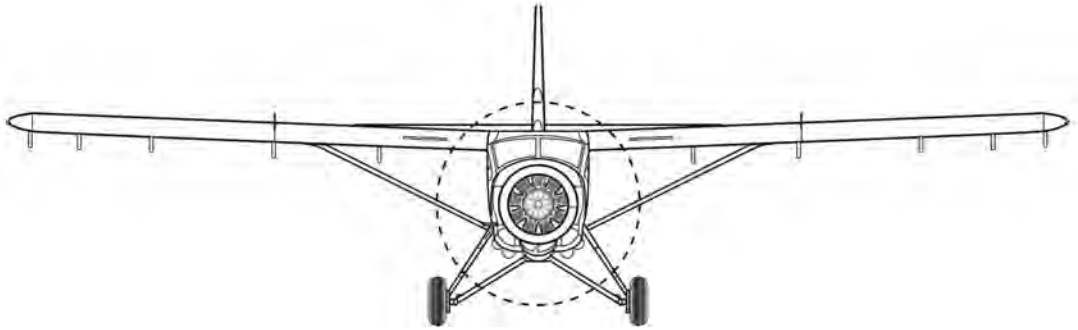
Powerplant: One 600-hp Pratt & Whitney R-1340-S1H1-G *Wasp* 9-cylinder air-cooled radial engine driving a three-bladed Hamilton Standard constant-speed propeller.

Performance: Max. speed 160-mph, cruise 121-mph; ceiling 18,800 ft.; range 945 mi.

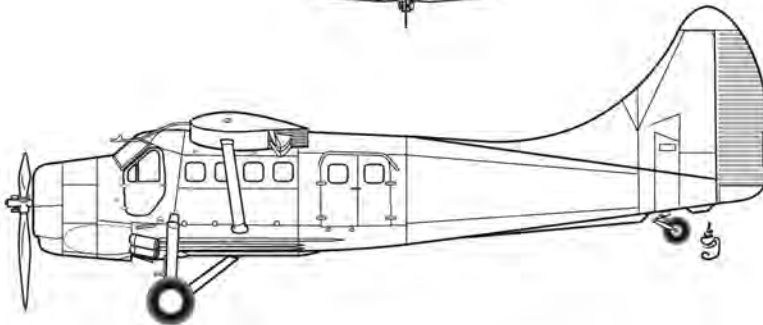
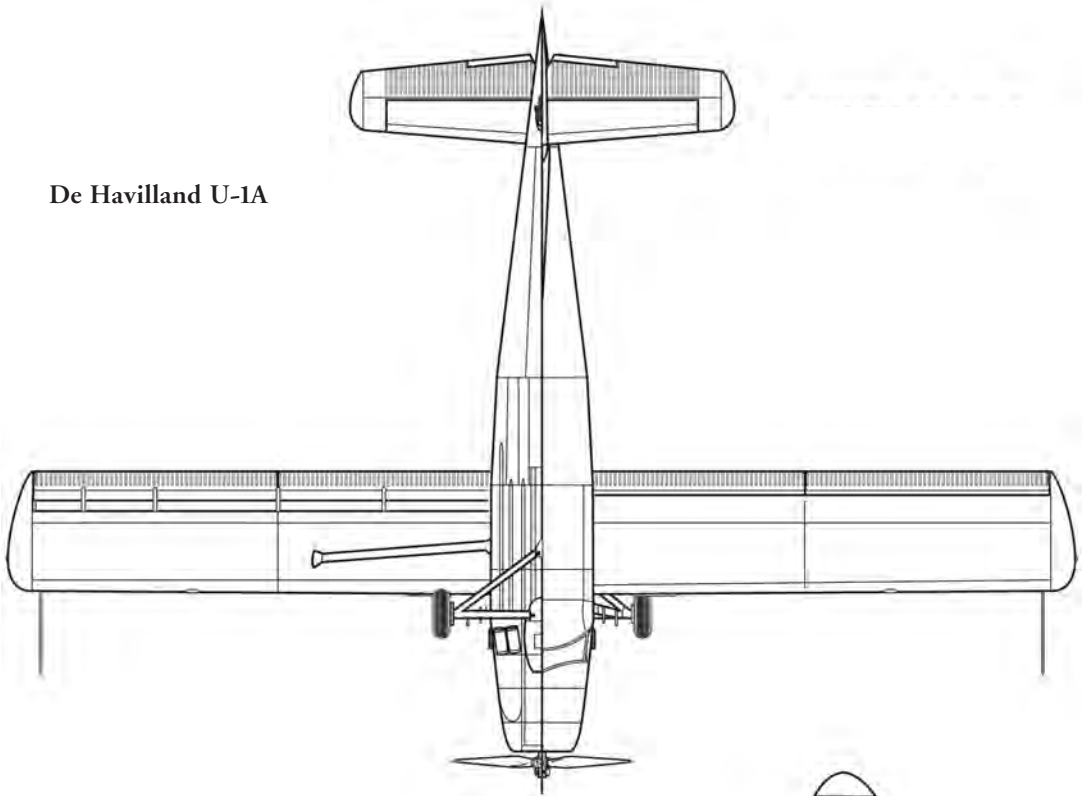
Weights: 4,431 lbs. empty, 8,000 lbs. max. takeoff.

Dimensions: Span 58 ft., length 41 ft. 10 in., wing area 375 sq. ft.

Coming as an enlarged by-product of its highly successful DHC-2 Beaver (see U-6, below), De Havilland of Canada's DHC-3 Otter completed its first flight from the factory on December 12, 1951. Like the Beaver, the Otter possessed a very rugged airframe and STOL capabilities that made it ideal for off-field, bush operations, either on wheels, skis, or floats. STOL performance was achieved by a strut-braced high-wing of relatively high-aspect ratio having double-slotted flaps and airflow fences on the upper surfaces. Using a conventional (tailwheel) layout,



De Havilland U-1A





**Formation of two nearly new Army U-1As seen early in their career, probably in 1955. At the time they were delivered, Otters were the largest type of fixed-wing transport in Army service.**

the main landing gear was heavily braced for rough operations. After testing a DHC-3 demonstrator in 1953, the Army ordered six examples for service evaluation under the designation YC-137 but changed it to YU-1 before deliveries commenced in early 1955. Soon afterward, De Havilland received the first of several contracts resulting in deliveries of 187 DHC-3s between 1956 and 1960, with 178 allocated to the Army and nine to the USAF. According to bureau number records, the Navy also procured 10 DHC-3s in 1955 or 1956 and placed them on the inventory under the designation UC-1.

In Army service, U-1As were distributed among aviation companies in every theater of operations. As the largest fixed-wing Army transport available at the time (except for a very small number of ex-USAF C-47s [see Series I, Part A, above]), Otters were employed for general logistical duties moving troops, supplies, medical evacuees, and staff as the need arose. In early 1962, U-1As became one of the first types of Army aircraft to be deployed in Vietnam where in addition to regular duties, they were often used for support operations to insert and extract Special Forces. While in Southeast Asia, several modified for use in electronics warfare support were re-designated RU-1A. In later service, a number of U-1As were sold or transferred to foreign air forces under military assistance programs (MAP), including South Vietnam and Cambodia. The last examples were withdrawn from Army service in 1974, and several are thought to have remained in the Army National Guard until 1979.

USAF use of the U-1A is not well documented. Miscellaneous photos suggest the type was

employed for logistics support in the far northern bases along the Distant Early Warning (DEW) line from Alaska to Greenland and some may have gone directly to foreign air forces under MAP. Of the 10 UC-1s accepted by the Navy, at least two were transferred directly to the Philippine Air Force. Other Navy UC-1s were employed to support Operation Deep Freeze in Antarctica from 1956 until the mid-1960s. Otters remaining on the Navy inventory after September 1962 were re-designated U-1B under the Tri-Service system. One U-1B, re-designated NU-1B after being assigned to the Navy Test Pilot School at NAS Patuxent River, Maryland during the 1970s to train pilots in low-airspeed flight, is still listed as operational on the NAVAIR website.

## U-2 (anomalous designation applied to Lockheed U-2 spyplane)

### Cessna U-3 (L-27)—1957

#### Technical Specifications (U-3A)

Type: Light utility transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 196 (158 USAF; 38 U.S. Army).

Capacity: Crew of two plus three passengers or 1,750 lbs. of cargo.

Powerplants: Two 240-hp Continental O-470-B 6-cylinder air-cooled horizontally opposed engines driving two-bladed Hartzell constant-speed propellers.

Performance: Max. speed 238-mph, cruise 180-mph; ceiling 22,000 ft.; range 900 mi.

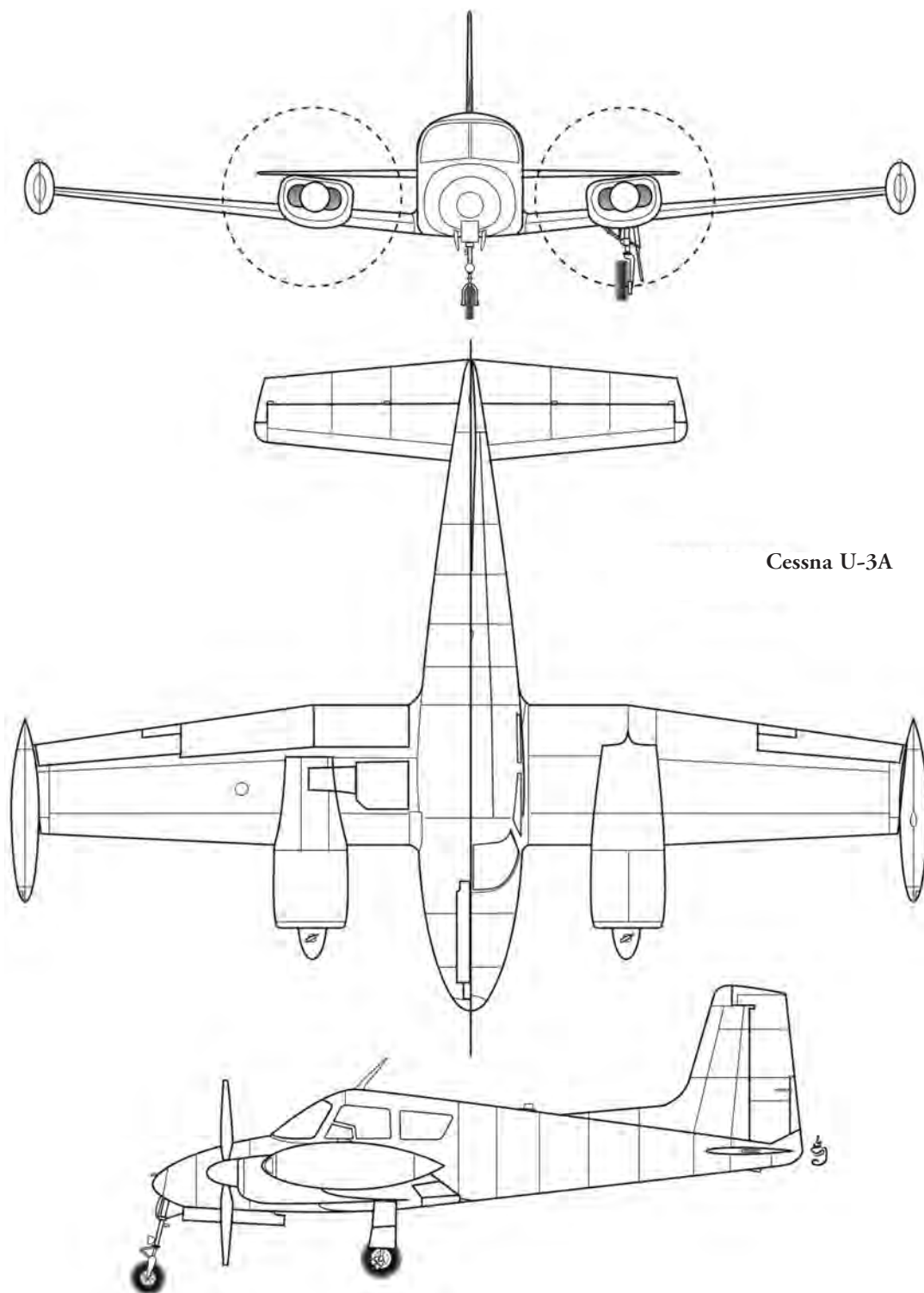
Weights: 2,850 lbs. empty, 4,830 lbs. max. takeoff.

Dimensions: Span 35 ft. 8 in., length 27 ft., wing area 175 sq. ft.



Delivery to the USAF of 160 Cessna 310s began in 1957 under the designation L-27A, changed to U-3A in mid-1962. The example seen has been preserved at the U.S. Air Force Museum in Dayton, Ohio.





Cessna U-3A

The Cessna model 310, introduced to the civil market in 1954, stands as one of the most successful light-twin aircraft designs of the post-war era. When production ceased in 1980 with the 310R, Cessna had delivered a total of 6,013 examples (including 575 as the model 320). The 310 set itself apart with a combination of sleek streamlining and excellent performance for the price (offered originally at \$51,500 new), and included other innovative features such as low-drag engine nacelles with exhaust augmenters and all fuel storage in large tip tanks. In 1957, the USAF selected the model 310A for service as a “light administrative liaison, cargo, and utility transport,” awarding Cessna a contract to deliver 160 factory stock aircraft under the designation L-27A. Cessna received a second military contract in 1960 with a USAF order for 36 model 310Es as the L-27B. The B differed from the A in having 260-hp O-470-D engines, a longer nose, added cabin windows, swept vertical tail surfaces, and all-weather avionics. Under the Tri-Service designation system adopted in mid-1962, the L-27A became the U-3A and the L-27B, the U-3B.

As delivered to the USAF, U-3A/Bs were assigned to various air base wings and support units for general utility transportation duties. In service, the type earned the unofficial nickname “Blue Canoe” due to a distinctive dark blue paint scheme trimmed in white with “U.S. Air Force” on each tip tank. The USAF began retiring its U-3s during the 1970s, and the last, a U-3B, was withdrawn from Eglin AFB, Florida in 1985. Starting in 1960, the first of 25 L-27A/U-3As were transferred from the USAF to the Army, followed some years later by transfer of 13 L-27B/U-3Bs. In Army service, U-23A/Bs functioned primarily as staff and VIP transports, though several were used for electronics testing and air-route survey work. During the 1970s, the Army transferred a number of U-3s to National Guard and Army Reserve units, however, dates of service are not reported and none are active today. A number of former USAF and Army U-3s, sold surplus, are still on the active civil register.

## Aero Design U-4 and U-9 (L-26) Commander—1952

### Technical Specifications (U-4B/-9C)

Type: Light utility transport.

Manufacturer: Aero Design & Engr. Co., Bethany, Oklahoma.

Total military versions: 29 (15 USAF; 14 U.S. Army).

Capacity: Crew of two plus five passengers or 2,200 lbs. of cargo.

Powerplants: Two 290-hp Lycoming GSO-480-1 supercharged 6-cylinder air-cooled horizontally opposed engines driving three-bladed Hartzell constant-speed propellers.

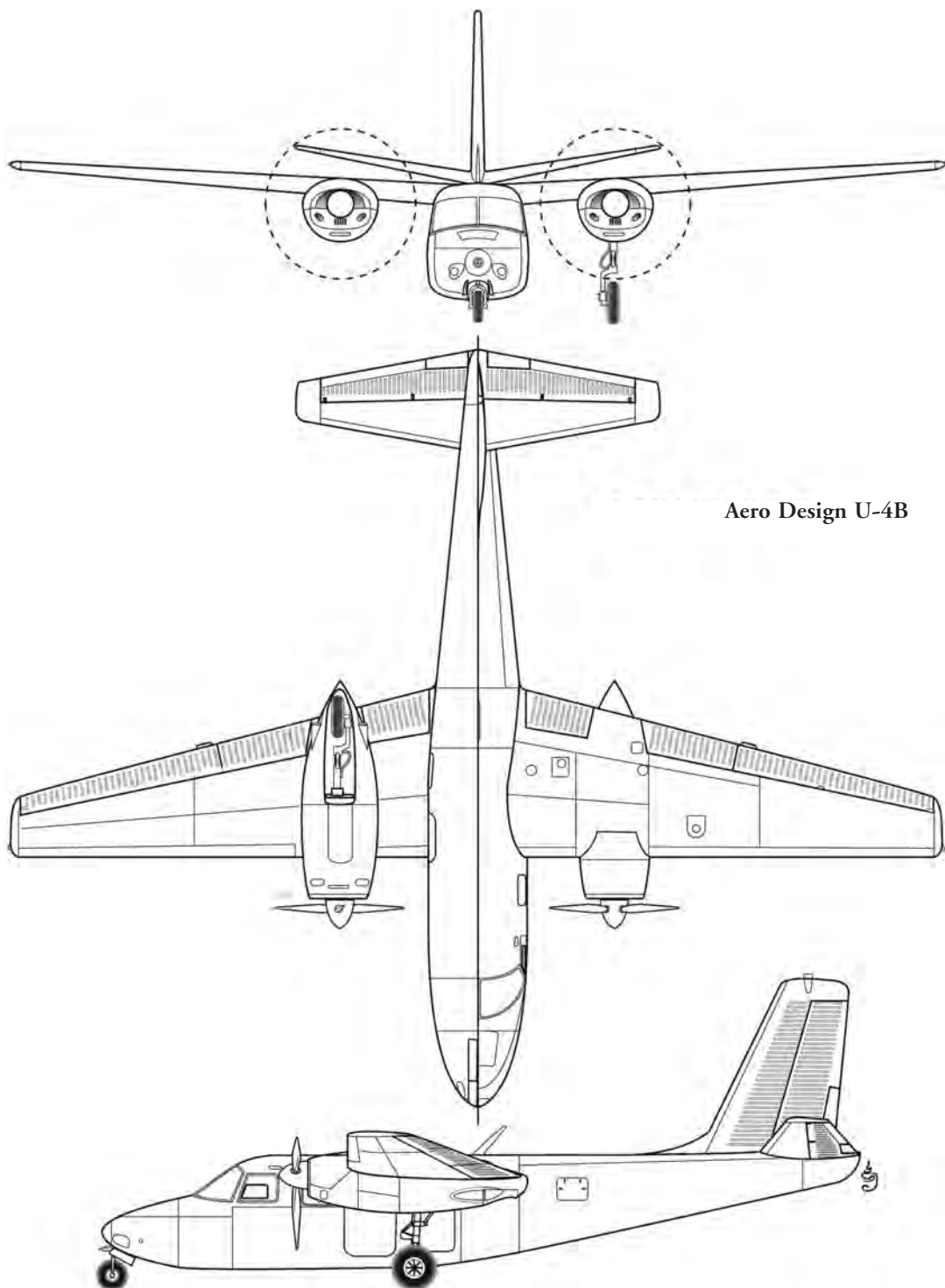
Performance: Max. speed 209-mph, cruise 200-mph; ceiling 22,000 ft.; range 1,100 mi.

Weights: 3,900 lbs. empty, 6,000 lbs. max. takeoff.

Dimensions: Span 44 ft., length 34 ft. 5 in., wing area 246 sq. ft.

The well-known Aero Commander family of twin-engine business aircraft was the brain-child of Ted R. Smith, the project engineer at Douglas most responsible for the design of the A-26 Invader. Thus, when the Aero Design L3805 prototype emerged for its first flight in April 1948, it is no surprise that it bore a strong family resemblance to the Invader in terms of high-wing layout and overall aerodynamic design. Deliveries of the first production models, known as the Aero Commander 520, commenced in mid-1951. Powered by 260-hp Lycoming GO-435-C2B engines, the 520 could carry up to seven people or 1,700 lbs. of payload at a cruise speed of 197-mph.

In October 1952 the Army acquired three 520s for evaluation under the designation YL-26, but elected not to order the type in quantity. The next military order came in 1955 when



**Aero Design U-4B**



One of the three Aero Commander 520s purchased by the Army in late 1952 as the YL-26. In 1962 these aircraft were re-designated U-9A.



Company photograph of one of the 14 Aero Commander 560s delivered to the USAF in 1955 as the L-26B. Re-designated U-4B in 1962, these planes served as staff transports until the early 1970s.

the USAF purchased one model 560 for evaluation as the YL-26A, which differed from the YL-26 in having 290-hp Lycoming GO-480-B engines, a swept vertical fin, increased gross weight, and structural improvements. Although serial number records indicate the YL-26A was lost in a crash during 1955, the USAF nonetheless went ahead and procured 14 more model 560s the same year that subsequently entered service as the L-26B, and one example was transferred to the Army in 1957 under the same designation. In 1956 Aero Design received orders for six model 560As under the military designation L-26C, four delivered to the Army and two to the USAF. The model 560A featured another engine upgrade, a nine-inch fuselage stretch, redesigned engine nacelles, and stronger landing gear. The final factory orders came in 1957 and 1958, when the Army acquired three model 580s that were subsequently modified for installation of side-looking radar systems under the designation RL-26D and a fourth for electronics system testing as the NL-26D. Model 580s were similar to 560As except for 32-inch wingtip extensions. With adoption of the Tri-Service system in 1962, the following new designations were applied: YL-26 to YU-9A; L-26B to U-4A (USAF) and U-9A (Army); L-26C to U-4B (USAF) and U-9C (Army); RL-26D to RU-9D; and NL-26D to NU-9D.

In Army service, the L-26/U-9s saw use primarily as VIP transports between major Army commands. The last examples are thought to have been withdrawn from service during the early 1980s. The three Army RU-26D/U-9Ds were initially used to evaluate and test the radar and electronic systems used on the Grumman AO/OV-1 Mohawk EW platform. Two of these were destroyed in accidents during the 1960s, but one is thought to have served until the late 1980s. The single NL-26D/U-9D was lost in a crash in 1969. Although the service of L-26/U-4s in USAF is not well documented, they appear to have been used mainly as staff transports, with most U-4As being withdrawn in the late 1960s and U-4Bs in the mid-1970s. From 1956 to 1960, one USAF L-26B/U-4B repainted in the blue and white livery, was assigned to the 89th Airlift Wing at Andrews AFB, Maryland, where it was used by President Eisenhower for short trips as "Air Force One." Afterward, from 1969 to 1977, the same aircraft was used by the U.S. Air Force Academy for parachute training.

## Helio U-5 Twin Courier—1963

### Technical Specifications (U-5A)

Type: Light STOL utility transport.

Manufacturer: Helio Aircraft Corp., Pittsburg, Kansas.

Total military versions: 7 (USAF/CIA).

Capacity: Crew of two plus four passengers or 2,800 lbs. of cargo.

Powerplants: Two 250-hp Lycoming O-540-A2B 6-cylinder air-cooled horizontally opposed engines driving two-bladed Hartzell constant-speed propellers.

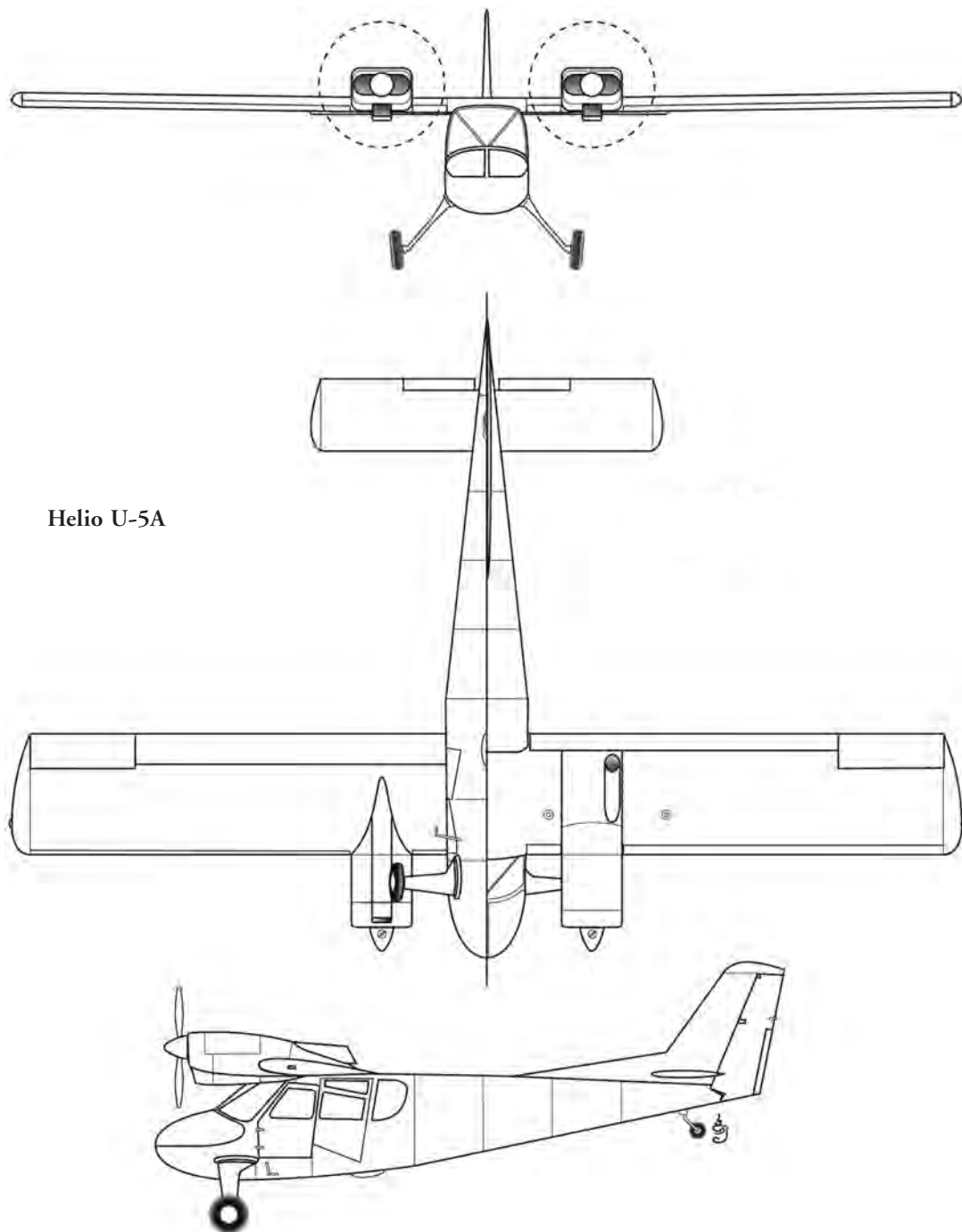
Performance: Max. speed 185-mph, cruise 166-mph; ceiling 19,500 ft.; range 1,500 mi.

Weights: 3,126 lbs. empty, 5,850 lbs. max. takeoff.

Dimensions: Span 41 ft., length 32 ft., wing area 242 sq. ft.

The H-500 Twin Courier flew for the first time in April 1960 as a slightly enlarged, twin-engine development of the company's H-391/395 series (see U-10, below). There are no military serial number records on the aircraft, but according to Aerofiles (see <http://www.aerofiles.com/aircraft.html>), seven H-500s, purchased through the USAF were delivered to the CIA during the early and mid-1960s to be used for covert operations in Southeast Asia. Two H-500s, designated U-5A, were thought to have been delivered in 1962 or 1963; and three, with longer noses and 290-hp engines, as the U-5B in 1967 or 1968. Aerofiles also reports that no civil variants were ever offered, and that Helio did not retain any manufacturing records for them.





**Helio U-5A**



Very rare picture of one of seven U-5 Twin Couriers delivered in military markings, probably in 1962 or 1963. Though procured under USAF serial numbers, they are thought to have been operated by the CIA.

## De Havilland U-6 (L-20) Beaver —1951

### Technical Specifications (U-6A)

Type: Light STOL utility transport.

Manufacturer: De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada.

Total military versions: 968 (761 U.S. Army; 204 USAF; 3 USN).

Capacity: One pilot plus seven troops, one medical litter, or 1,200 lbs. of cargo.

Powerplant: One 450-hp Pratt & Whitney R-985-SB3 *Wasp Junior* 9-cylinder air-cooled radial engine driving a two-bladed Hamilton Standard constant-speed propeller.

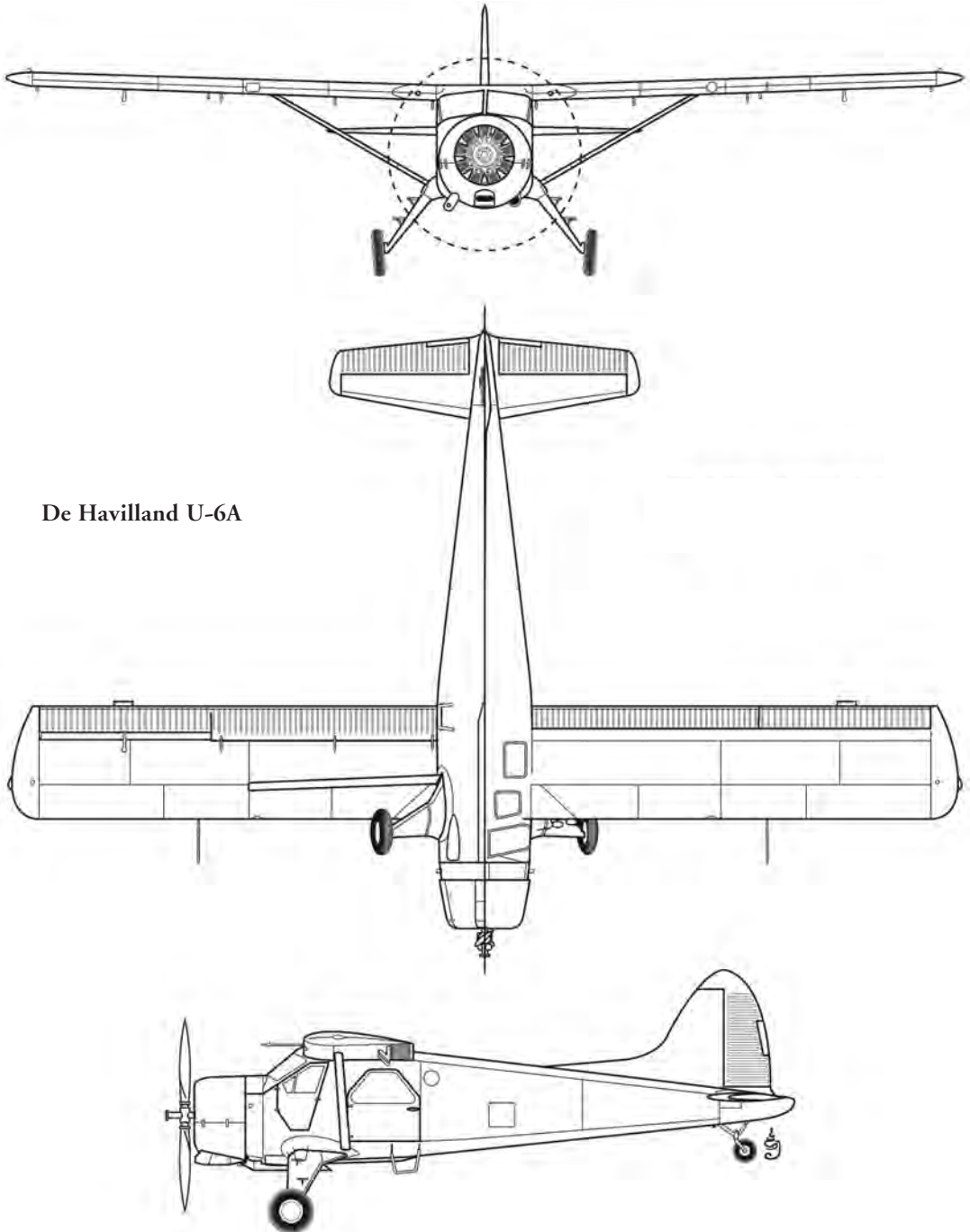
Performance: Max. speed 163-mph, cruise 130-mph; ceiling 20,000 ft.; range 455 mi.

Weights: 3,000 lbs. empty, 5,100 lbs. max. takeoff.

Dimensions: Span 48 ft., length 30 ft. 4 in., wing area 250 sq. ft.

Possibly the best-known bush aircraft in the history of aviation, the fabled De Havilland of Canada DHC-2 Beaver made its first flight on August 16, 1947, with deliveries of the civil production versions starting nine months later. From the beginning, the airframe design of the DHC-2 had been optimized for bush operations, combining a rugged, all-metal fuselage structure and wide-track landing gear with a high-aspect ratio wing that employed full-span flaps and flaperons to assure excellent STOL performance; and the power available from the R-985 powerplant enabled it to carry a very respectable payload of 2,100 lbs.

However, Beavers sold at a modest rate of two to three per month until 1950, when the U.S. military first evinced an interest in the type. With the outbreak of war in Korea, the Department of Defense relaxed its restrictions on buying foreign-made aircraft and authorized procurement of six DHC-2s for evaluation purposes. The aircraft were delivered in two batches during 1951 under the designation YL-20, with four allocated to the USAF and two to the Army. The Army was particularly interested: because its post-1947 aviation establishment consisted



De Havilland U-6A

primarily of two-seat, fixed-wing liaison types and small training helicopters, it was in desperate need of a utility transport to support combat operations in Korea. Soon afterward, De Havilland of Canada received the first in a series of military contracts that resulted in delivery of some 967 Beavers from 1952 to 1961 as the L-20A, plus a final example in 1964 as the U-6A.

Except for military radios and navigation equipment, L-20As were identical to civil



**Army L-20A Beaver attached to Army Field Forces is seen running-up during the 1950s. Army Aviation companies used Beavers for a variety of tasks. Re-designated U-6A in 1962 and phased out during the early 1970s.**

DHC-2s. Of the total produced, historical references indicate that at least 654 entered active service with the Army and 200-plus with the USAF. The extra 114 L-20As that appear on serial number records might have been direct transfers to foreign air forces under MAP and deliveries to federal government agencies. Six L-20As later became L-20Bs after equipment changes, then after adoption of the Tri-Service designation scheme in mid-1962, the L-20A became the U-6A and the L-20B, the U-6B. During the Vietnam War, 20 U-6As modified for airborne radio direction finding were re-designated RU-6A and several others, fitted with dual controls as trainers, became the TU-6A. Three U-6As, two ex-USAF and one ex-Army, were transferred to the Navy in 1973 and 1974.

When production L-20As began reaching Army service in 1952, they were the largest fixed-wing utility transports available until the appearance of U-1A Otters (see, above) in 1955. Early on, Army Aviation companies used their increasing numbers of L-20As for a multiplicity of airborne missions — combat communications, cargo, dropping supplies and paratroops, medical evacuation, photo-reconnaissance, radio relay, wire-laying, and tactical observation. Later, operating as the U-6A in Southeast Asia, Army Beavers continued to play an important role, flying missions to move troops and supplies in and out of scattered military outposts in South Vietnam. Six or seven Army U-6As leased to Air America in the early 1960s flew operations out of Udorn, Thailand to support Special Forces teams in Laos. During the mid-1960s, the advent of larger Army helicopters like the Bell UH-1 Huey and Boeing-Vertol CH-47 Chinook made the utility role of aircraft like Beavers and Otters less important. Most U-6As had been phased-out of active Army service by the early 1970s, while a small number continued a few years longer in Army National Guard units.

As production L-20As were delivered to the USAF in 1952, most were assigned to 10th Liaison Squadron in Korea where they were used principally for medical evacuation but also to

transport personnel and light cargos. Later, L-20As painted in high-visibility schemes flew a variety of missions — courier, rescue, photographic, and light logistics — in support of USAF bases and stations in northern regions like Alaska and along the DEW line. As U.S. military involvement stepped-up in Southeast Asia from 1962 to 1965, a number of USAF L-20As (U-6A after 1962) were diverted to the combat zone to serve as general utility transports. Even so, the process of withdrawing the type from active USAF service had begun in the early 1960s when many were transferred to ANG and USAFR units or placed in AMARC storage. Ex-USAf Beavers are thought to have served with ANG Air Commando Squadrons in California, Maryland, Rhode Island, and Vermont until the mid-1970s. Nine ex-USAf U-6As are currently operated and maintained by the Alaska Wing of Civil Air Patrol. The three Beavers transferred to the Navy in the 1970s all entered service with the U.S. Naval Test Pilot School at NAS Patuxent, Maryland, and as of mid-2011, two are still being used as tow planes for the school's glider.

## Piper U-7 (L-21) — 1951

### Technical Specifications (U-7A)

Type: Light STOL utility transport.

Manufacturer: Piper Aircraft Corp., Lockhaven, Pennsylvania.

Total military versions: 734 (U.S. Army).

Capacity: One pilot plus one passenger.

Powerplant: One 135-hp Lycoming O-290-D2 4-cylinder air-cooled horizontally opposed engine driving a two-bladed McCauley fixed-pitch propeller.

Performance: Max. speed 123-mph, cruise 108-mph; ceiling 17,100 ft.; range 400 mi.

Weights: 1,015 lbs. empty, 1,800 lbs. max. takeoff.

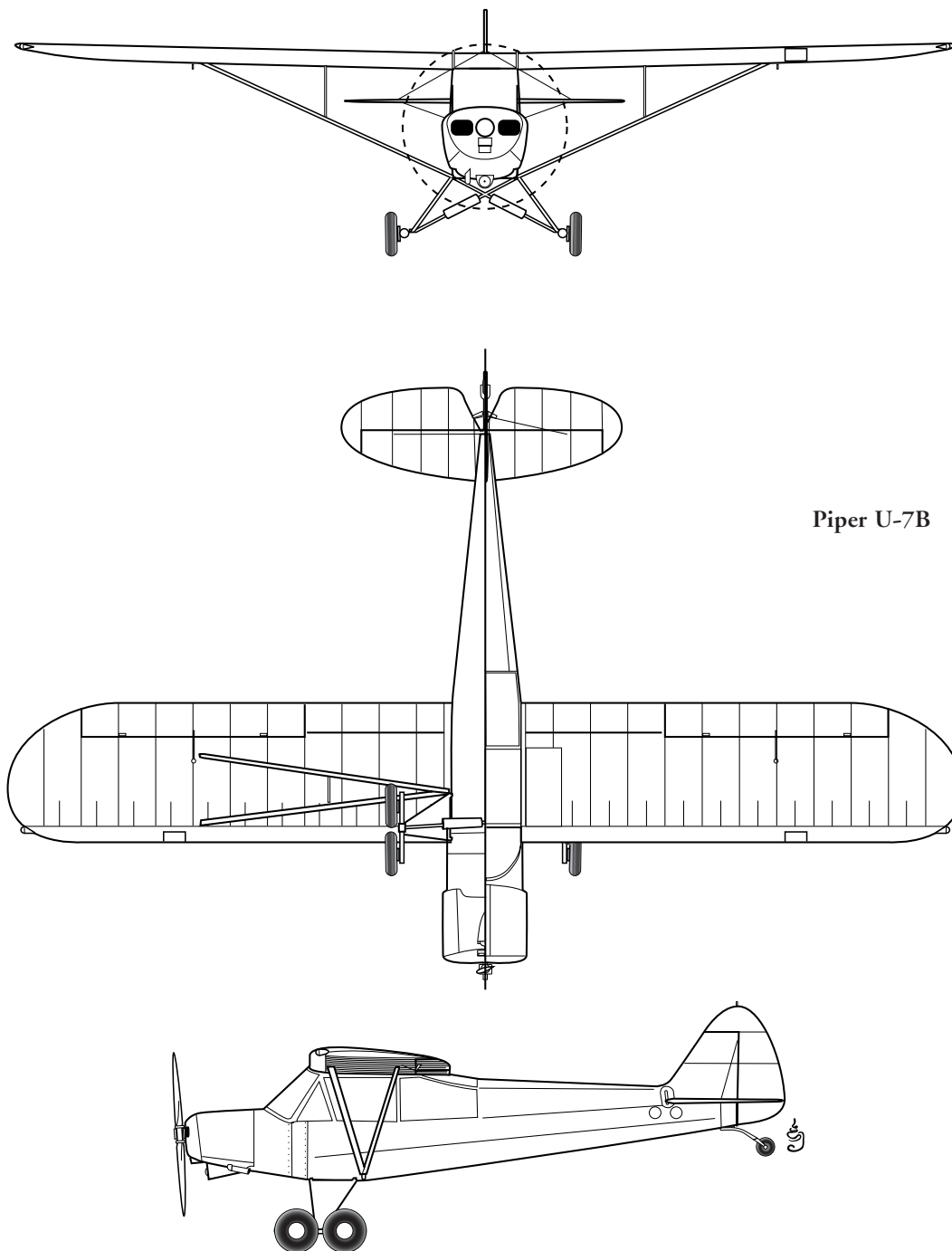
Dimensions: Span 35 ft. 3 in., length 22 ft. 7 in., wing area 179 sq. ft.

Preceded by the ubiquitous L-4 Grasshopper (based on the J-3C Cub) and L-18 (based on the PA-11 Cub 95), the L-21 (based on the PA-18 Cub 135, later Super Cub) appeared in 1951



A direct descendant of the ubiquitous L-4 Grasshopper, the Army used most of 150 L-21As as fixed-wing trainers and hacks. A few remaining in service in 1962 became the U-7A.





Piper U-7B

as the final evolution of Piper's two-seat liaison series. After evaluating two Cub 135s as the YL-21, the Army awarded Piper a contract for 150 aircraft under the designation L-21A, all of which were delivered by the end of 1951. Powered by 125-hp O-290-11 engines, some L-21As went directly to NATO and other foreign air forces while others, after being re-designated TL-21A, served as trainers in the Army's fixed-wing program. In 1952, the Army gave Piper an

order for 584 improved PA-18 variants as the L-21B. The Bs differed from As in having 135-hp -D2 engines, fully articulating wing flaps, and provision for tandem-wheel main landing gear. But in their intended tactical liaison and observation role, most L-21Bs were transferred to foreign air forces under MAP as the more capable Cessna L-19 Bird Dog arrived for service to supplant them. A handful of L-21A/Bs still serving with Army Reserve units in 1962 were re-designated U-7A/B.

## **Beech U-8 (L-23) Seminole—1952**

### **Technical Specifications (U-8D)**

Type: Light utility and staff transport.

Manufacturer: Beech Aircraft Corp., Wichita, Kansas.

Total military versions: 274 (273 U.S. Army; 1 USAF).

Capacity: One pilot plus five passengers or 2,220 lbs. of cargo.

Powerplants: Two 340-hp Lycoming GSO-480-B1B6 supercharged 6-cylinder air-cooled horizontally opposed engines driving three-bladed Hartzell constant-speed propellers.

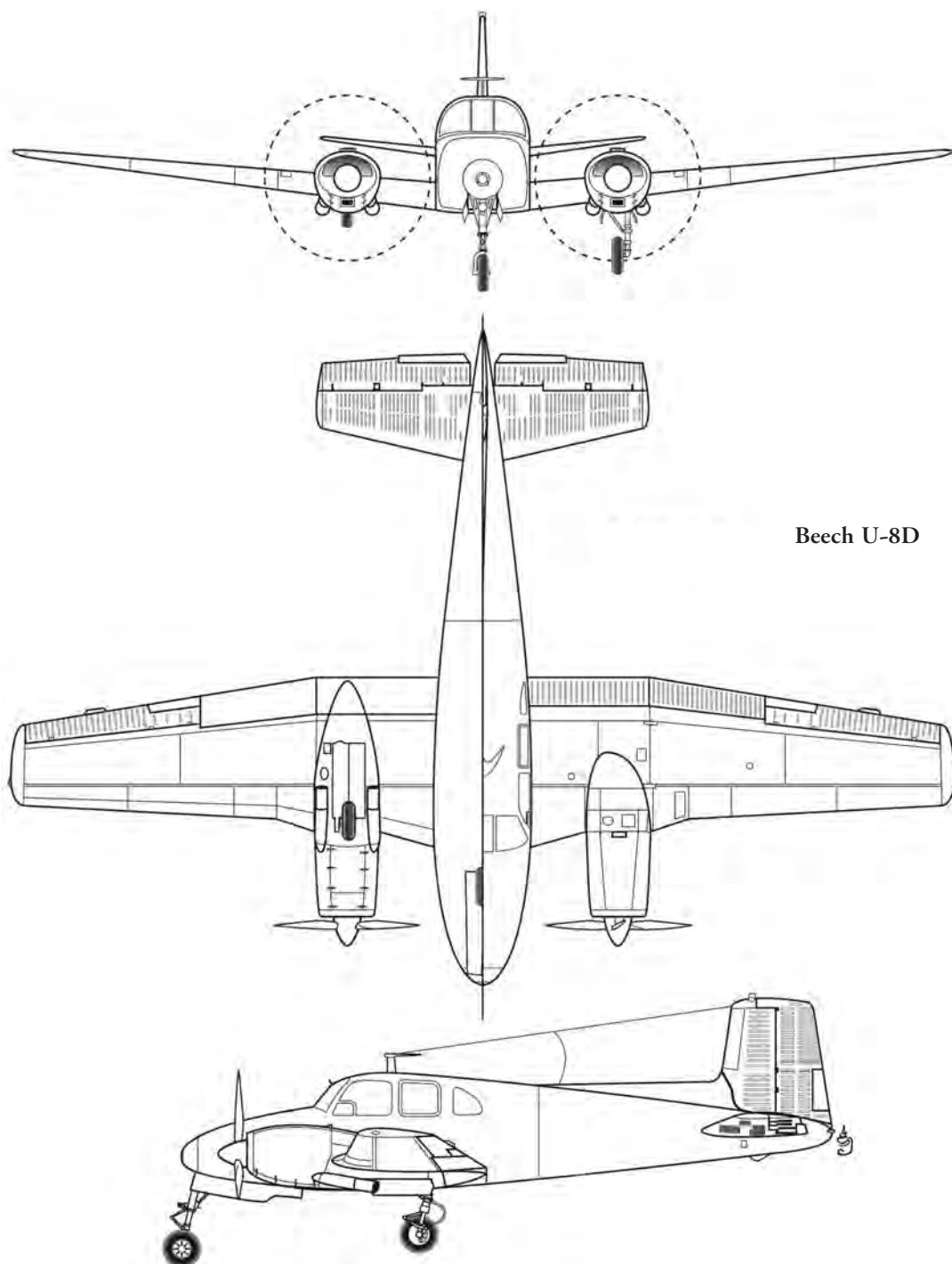
Performance: Max. speed 233-mph, cruise 180-mph; ceiling 27,100 ft.; range 1,350 mi.

Weights: 4,970 lbs. empty, 7,300 lbs. max. takeoff.

Dimensions: Span 45 ft. 3 in., length 31 ft. 6 in., wing area 277 sq. ft.

During a career spanning almost four decades, the Beech L-23/U-8 series grew to become the most numerous type of twin-engine, light transport in the U.S. Army inventory. Its origins are traceable to early 1949, when Beech started design work on the Model 50 “Twin Bonanza,” and managed to have the prototype flying before the end of the year. Emerging as a six-place light-twin powered by 260-hp Lycoming GO-435-C2 engines, the company hoped to market it to business travelers as a mid-sized alternative between the model A35 Bonanza and the much larger model D18. In 1951, while the new aircraft was still in the midst of type certification, Beech received an Army order for four model 50s to be tested under the designation YL-23. Shortly after official evaluations began in early 1952, the Army was sufficiently impressed to award Beech a contract for 55 production models as the L-23A, with initial deliveries starting by the middle of the year. The next Army order came in 1953 for 40 model B50s featuring a propeller upgrade and detail improvements, which entered service during 1954 as the L-23B. In 1955 the USAF acquired a single model C50 (275-hp Lycoming GO-480-F1A6 engine upgrade) for evaluation as the YL-23C. Two new Army contracts given to Beech in 1955 and 1956 produced out-of-order designations: six model D50s with 295-hp GO-480-G2C2 engines and a third cabin window were delivered in 1956 as the L-23E; and 85 model E50s with 340-hp GSO-480-B1B6 supercharged engines and three-bladed propellers entered service during 1956 and 1957 as the L-23D.

Starting in 1958, the Army instituted an upgrade program in which all remaining L-23As and Bs were re-engined and otherwise brought up to the D standard. After installation of side-looking radar systems mounted in belly pods in 1959 and 1960, 20 L-23Ds were re-designated RL-23D to be operated as airborne electronic intelligence (ELINT) platforms. In 1959, a year after Beech introduced the model 65 Queen Air, the Army ordered three off-the-shelf examples for evaluation as the L-23F. Using the model E50's wings, engines, and tail group, the model 65 featured an all-new fuselage, lengthened and widened with aisle-type seating for six passengers. In a series of contracts from 1960 to 1964, the Army contracted for a further 76 model 65s, delivered as the L-23F until mid-1962 and thereafter, as the U-8F. Other 1962 designation changes were as follows: L-23D, including upgraded L-23As and Bs, to U-8D; RU-23D to RU-8D; L-23E to U-8E; and XL-23C (USAF) to U-8G. Seven U-8Ds and four U-8Es sub-



Beech U-8D



Altogether, the Army procured 187 Twin Bonanza variants from 1952 to 1957. Photograph depicts one of 85 L-23Ds delivered in 1956 and 1957. Became U-8Ds under the 1962 Tri-Service designation scheme.



Army U-8F, originally delivered as the L-23F, seen in the early 1960s. Based on the larger Queen Air fuselage, U-8F remained in service with National Guard and reserve units until the early 1990s.

sequently rebuilt with new engines, increased passenger seating, and upgraded avionics were also re-designated as the U-8G. One model 65 fitted with 500-shp Pratt & Whitney PT6A-6 turboprop engines delivered to the Army in 1964 was evaluated as the NU-8F but later re-designated YU-21 (see, below). In addition to factory procurements, three ex-civil model 65s were subsequently added to the Army inventory as the U-8F, one purchased in 1966, plus two confiscated from drug smugglers in 1981.

The earliest Army L-23 variants arrived in time to see service as VIP transports in the Far East during the Korean War. From the mid-1950s onward, L-23/U-8s served as the Army's principal type of staff transport between various bases and commands, both in the continental U.S. and overseas. Army L-23/U-8s operating in Europe, jokingly referred to as TWA ("teeny weeny airlines"), provided a transportation network between bases all over the continent. In Southeast Asia from 1965 to 1972, RU-8Ds flew ELINT sorties in South Vietnam while U-8D and Fs regularly operated out of Saigon and Da Nang as part of Military Assistance Command Vietnam (MACV). The Army began the process of phasing-out U-8Ds during the late 1960s, but many U-8Fs, even after being replaced with newer aircraft like the turboprop-powered Beech U-21, continued in service for many years with Army National Guard and Reserve units until the last examples were withdrawn in 1992.

### **Helio U-10 (L-24 and -28) Courier/ Super Courier —1952**

#### **Technical Specifications (U-10B/D)**

Type: Light STOL utility transport.

Manufacturer: Helio Aircraft Corp., Pittsburg, Kansas.

Total military versions: 192 (120 USAF; 52 U.S. Army).

Capacity: One pilot plus five passengers or 1,320 lbs. of cargo.

Powerplant: One 295-hp Lycoming GO-480-G1D6 6-cylinder air-cooled horizontally opposed engine driving a three-bladed Hartzell constant-speed propeller.

Performance: Max. speed 167-mph, cruise 152-mph; ceiling 27,100 ft.; range 1,100 mi.

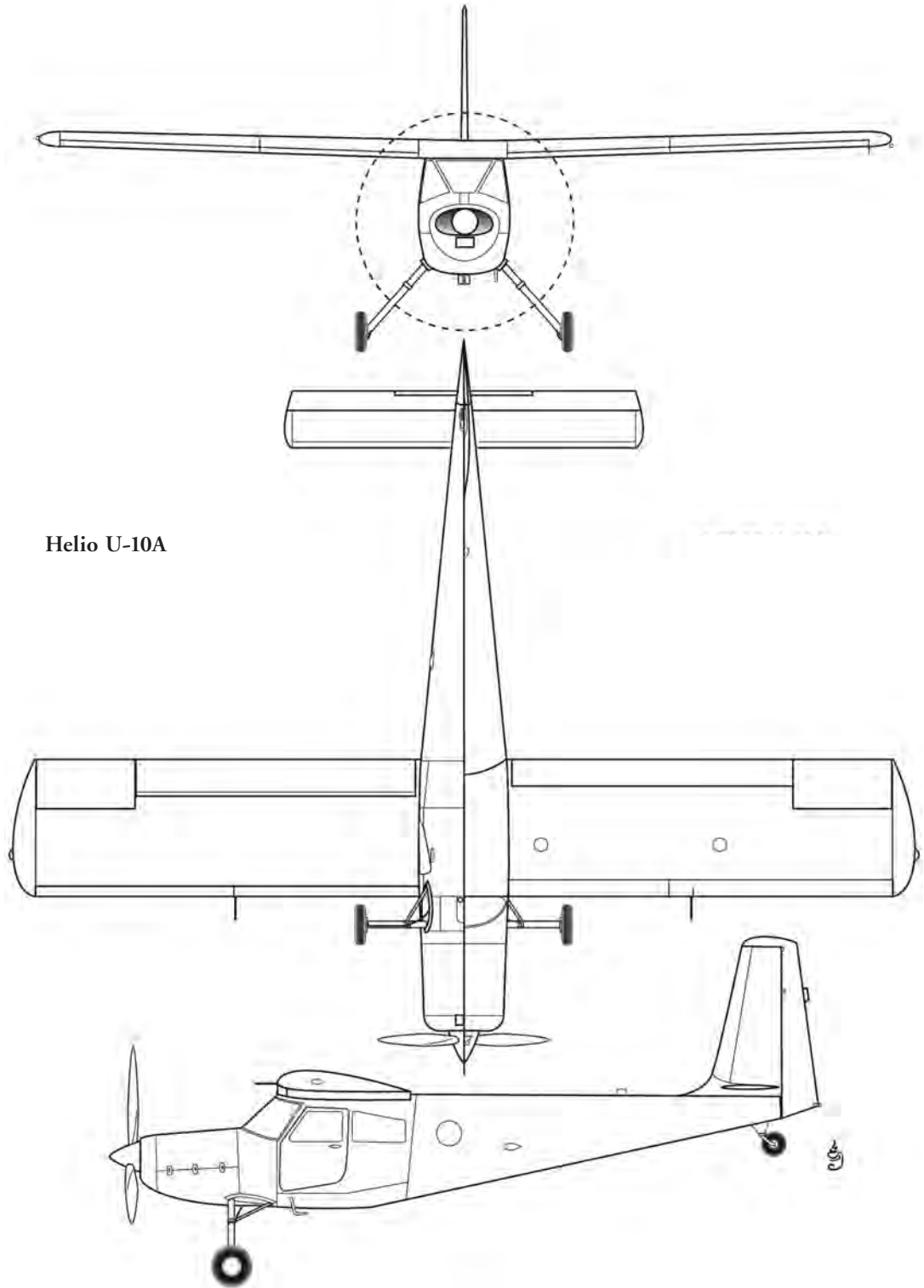
Weights: 2,080 lbs. empty, 3,600 lbs. max. takeoff.

Dimensions: Span 39 ft., length 30 ft. 8 in., wing area 231 sq. ft.

During the late 1940s, aeronautical engineer Dr. Otto C. Koppen of MIT and Dr. Lynn Bollinger of the Harvard Business School joined forces to design and develop a light utility aircraft that would possess unsurpassed STOL capabilities, yet deliver very good overall performance in terms of speed, range, and payload. After forming Helio Aircraft and experimenting with the "Helio Plane," an extensively modified Piper PA-17 Vagabond, the company introduced the mixed construction (metal wings and tail group with steel tube fuselage covered in fabric aft of cabin) H-391 Courier prototype in 1949. A combination of features — a wing incorporating full-span leading-edge slats and slotted trailing-edge flaps across 70 percent of the span, tall vertical tail surfaces and an all-moving stabilizer for low-air-speed control, and the thrust from a 260-hp Lycoming GO-435-C2B2 engine — enabled the H-391 to takeoff at 25 to 30-mph within a distance of 100 feet. A conventional gear arrangement with the main wheels located well forward permitted hard braking on landing, and for extra protection, the cabin was reinforced with a steel tube roll cage.

The Army ordered one H-391 that was delivered in 1953 and tested under the designation YL-24. Although evaluating officials were very impressed with the aircraft, budgetary restraints imposed by other aircraft procurement programs precluded additional purchases. No further military interest in the type arose until 1958, when the USAF acquired three H-395 Super Couriers for evaluation under the designation L-28A. Super Courier improvements included an aluminum-skinned fuselage and a more powerful GO-480-G1D6 engine. While the L-28As met or exceeded all performance expectations, no quantity orders were forthcoming until 1962 when the both the USAF and the Army were confronted with the need for STOL aircraft to support combat operations in the jungles of Southeast Asia. Military serial number records





**Helio U-10A**



**Super Courier variants served with the USAF and the Army. The USAF U-10D pictured in the markings of the 5th Air Commando Squadron is preserved at the U.S. Air Force Museum in Dayton, Ohio.**

indicate a total of 192 H-395s ordered from 1962 to 1966 under nine separate contracts, specifically: 29 (ordered as the L-23A) delivered in 1963 as the U-10A, with 27 allocated to the USAF and two to the Army; 78 delivered in 1963 and 1964 as the U-10B, with 57 allocated to the USAF and 21 to the Army; and 88 delivered between 1964 and 1966 as the U-10D, with 36 allocated to the USAF and 52 to the Army. The U-10B differed from the A in equipment details, and the U-10D came with an upswing paratrooper door.

Because they could operate from airstrips the size of a football field, USAF U-10s were supplied to Air Commando Squadrons (later renamed Special Operations Squadrons [SOS]) to perform a wide range of missions that included visual reconnaissance, light cargo, small air-drops, psychological warfare, search and rescue, and Forward Air Control (FAC). And when rigged with floats, U-10s could also undertake similar missions from small lakes and rivers. In 1962, after initial operational training, Air Commando U-10s were deployed to South and Central America to deliver food, clothing, and medical supplies for humanitarian relief, then in early 1963, as part of Operation Farm Gate, they were deployed to South Vietnam to be tested under actual combat conditions. For the “psych-war” missions, U-10s dropped printed leaflets and broadcast messages (propaganda) from loudspeakers mounted on the sides of the fuselage. From 1964, SOS U-10s flew hundreds of missions from bases in the South Vietnam highlands, Laos, and Thailand. The USAF withdrew the type from the combat theater in 1971 and virtually all had been removed from the inventory by 1973. During this time period, an unknown number of U-10 are thought to have been transferred to the VNAF and other foreign air forces under MAP. In Army service from 1965 to 1972, U-10s were used mainly in support of Special Forces operations in the Southeast Asia, with a small number also being based in the continental U.S. and in Europe. Although most U-10s in active Army units were replaced by helicopters during the 1970s, the last examples were not withdrawn from Special Forces Army Reserve units until 1985.

## Piper U-11 (UO) Aztec — 1960

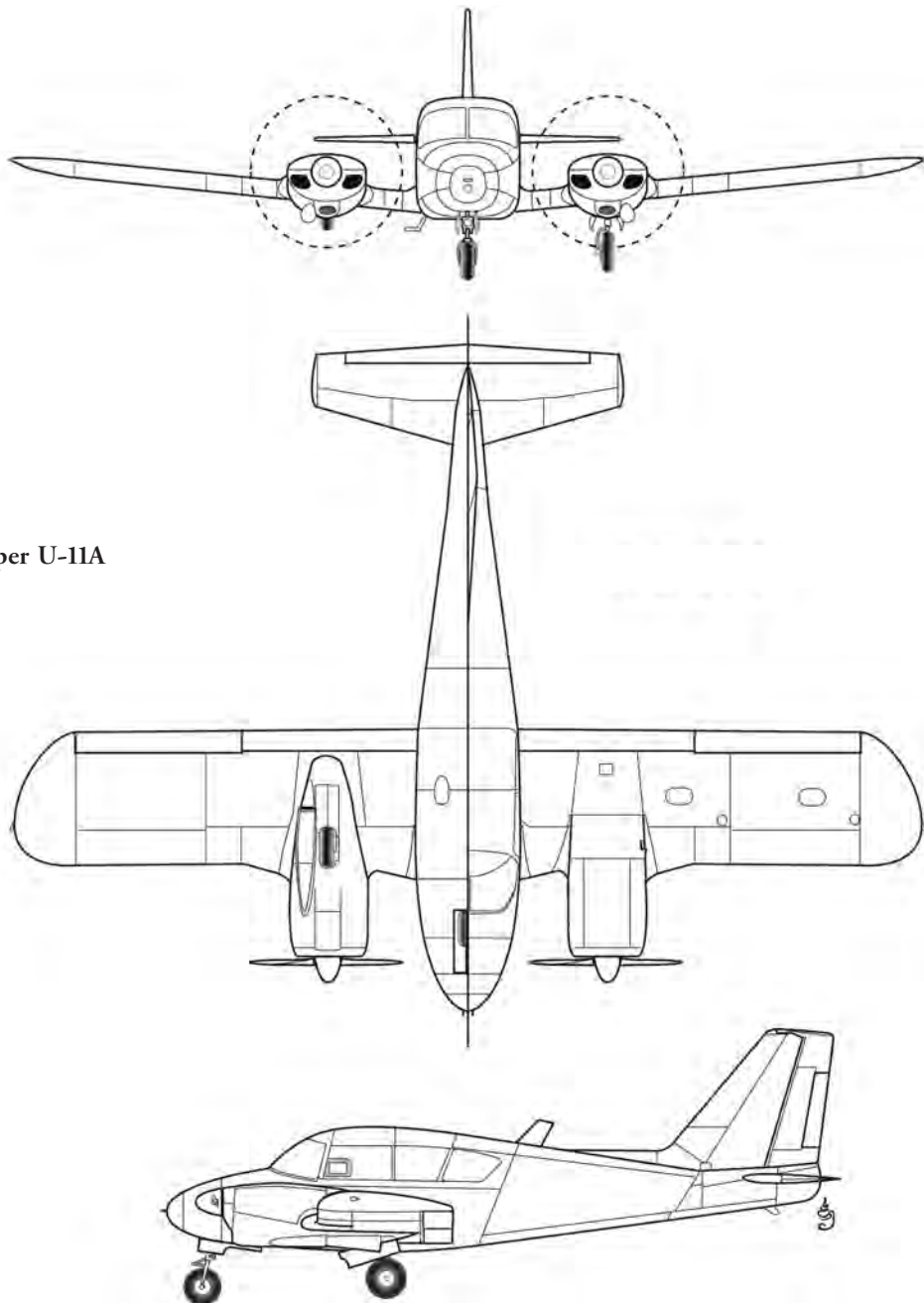
### Technical Specifications (U-11A)

Type: Light utility transport.

Manufacturer: Piper Aircraft Corp., Lockhaven, Pennsylvania.

Total military versions: 20 (USN).

Capacity: One pilot plus five passengers or 1,600 lbs. of cargo.



Piper U-11A



**Formation of two Navy UO-1s, redesignated as U-11As in 1962. Although originally procured as trainers, the Navy afterward distributed them among various commands to be used as staff transport and couriers.**

Powerplants: Two 250-hp Lycoming O-540-A1D 6-cylinder air-cooled horizontally opposed engines driving a two-bladed Hartzell constant-speed propellers.

Performance: Max. speed 215-mph, cruise 172-mph; ceiling 18,950 ft.; range 1,180 mi.

Weights: 3,180 lbs. empty, 5,200 lbs. max. takeoff.

Dimensions: Span 37 ft. 3 in., length 31 ft. 3 in., wing area 208 sq. ft.

The Piper PA-23-250 Aztec first appeared in 1958 as a progressive improvement of the earlier PA-23 Apache, which had actually started life in late 1940s as the Twin Stinson. In addition to more powerful engines, the Aztec differed from the Apache in having a lengthened nose, added side windows, swept vertical tail surfaces, and seats for a pilot and five passengers. The Navy procured 20 PA-23-250s in 1960 to be evaluated as multi-engine trainers under the naval designation UO-1; however, after testing revealed the type to be unsuited for the training role, the 20 aircraft were thereafter distributed among various naval station commands in the continental U.S. and Puerto Rico to serve as staff transports and couriers, and when the Tri-Service system was adopted in September 1962, their designation was changed from UO-1 to U-11A. One was operated by the Marine Corps. Serial number records indicate that most U-11As were withdrawn from service during the mid-1970s, though one source confirms that a few remained active until 1981 or 1982.

## U-12 through U-15 (not assigned)

U-16 (see Grumman UF [SA-16] and Series I, Part B)

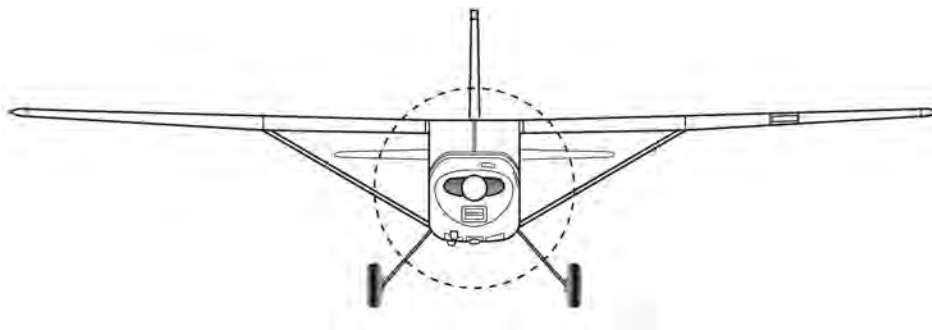
## Cessna U-17 Skywagon — 1963

### Technical Specifications (U-17B)

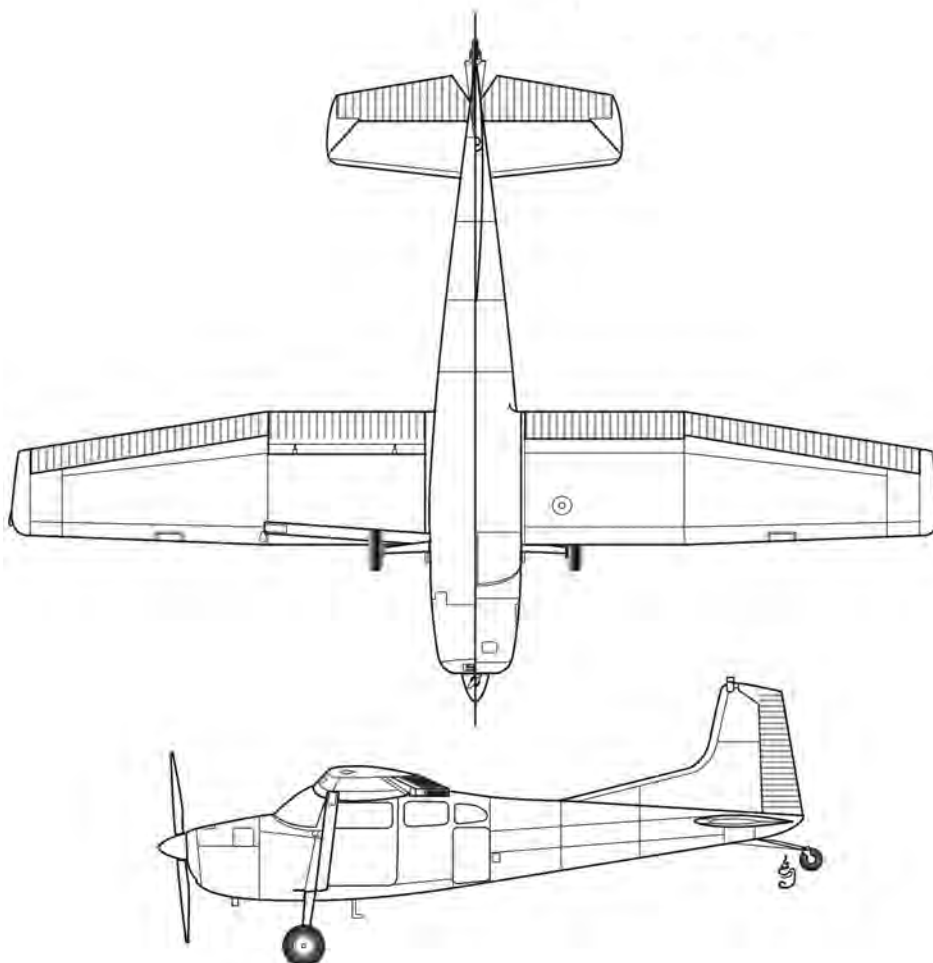
Type: Light utility transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 396 (USAF, all for MAP and FMS).



Cessna U-17A







**Greek Air Force U-17A with military markings painted over. All of the 396 U-17s procured with USAF serial numbers were delivered to foreign air forces under various military assistance programs.**

Capacity: One pilot plus five passengers or 1,000 lbs. of cargo.

Powerplant: One 300-hp Continental IO-520-D 6-cylinder air-cooled horizontally opposed engine driving a two-bladed Hartzell constant-speed propeller.

Performance: Max. speed 178-mph, cruise 167-mph; ceiling 17,150 ft.; range 830 mi.

Weights: 1,748 lbs. empty, 3,550 lbs. max. takeoff.

Dimensions: Span 35 ft. 10 in., length 25 ft. 9 in., wing area 174 sq. ft.

Directed primarily to commercial bush operators in regions like Alaska and Canada, Cessna introduced its six-place model 185 Skywagon in early 1961 as a strengthened and more powerful version of its four-place model 180, and by the time production ended in 1985, over 4,400 examples had been sold. From 1963 to 1973, some 396 model 185s were purchased under USAF serial numbers under the military designation U-17, although none actually served in USAF, USAFR, ANG, or U.S. Army units but went directly to foreign air forces under MAP or were classified as FMS (foreign military sales). Of the total procured, 264 were listed as U-17As (260-hp Continental IO-470-F engines), 123 as U-17Bs (300-hp Continental IO-520-D engines), and nine as U-17Cs (230-hp Continental O-470-L engines — may have been model 180s, not 185s). While technically not a military branch, five U-17As and seven U-17Bs operated by the CIA under the aegis of Air America are known to have been flown by American pilots in support of special operations during the Vietnam War (1965–1972).

## North American/Ryan U-18 (L-17) Navion —1947

### Technical Specifications (U-18A)

Type: Light utility and staff transport.

Manufacturer: North American Aviation, Inc., Downey, California; and Ryan Aeronautical Co., San Diego, California.

Total military versions: 249 (200 U.S. Army; 49 USAF [est.]).

Capacity: One pilot plus three passengers.

Powerplant: One 185-hp Continental E-185-2 (O-470) 6-cylinder air-cooled horizontally opposed engine driving a two-bladed Hartzell variable-pitch propeller.

Performance: Max. speed 163-mph, cruise 155-mph; ceiling 15,050 ft.; range 700 mi.

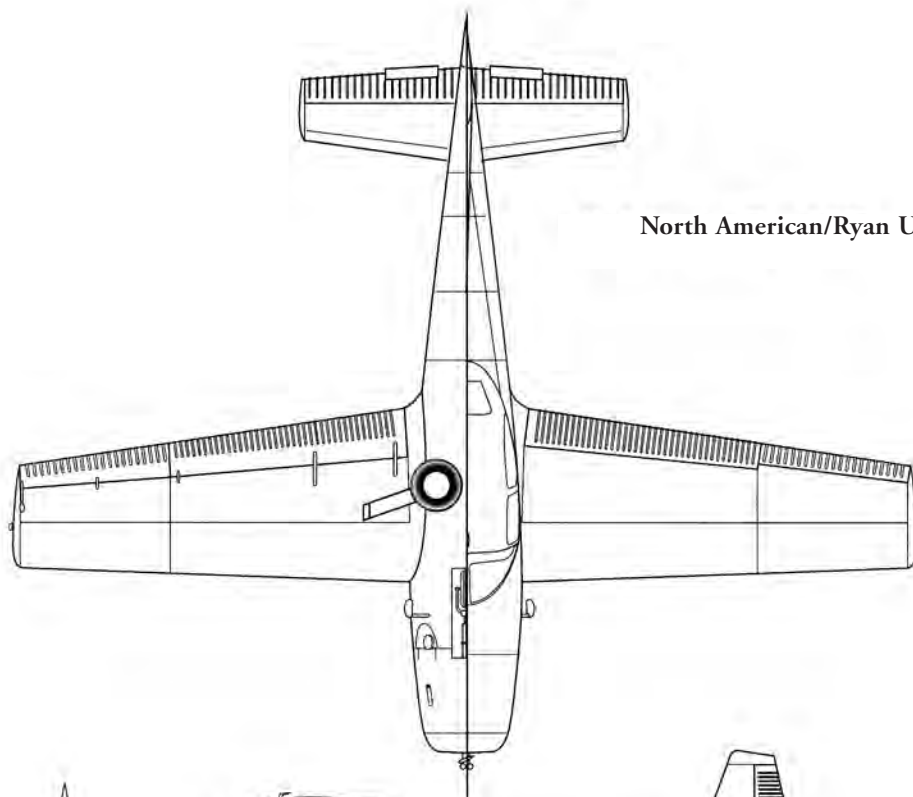
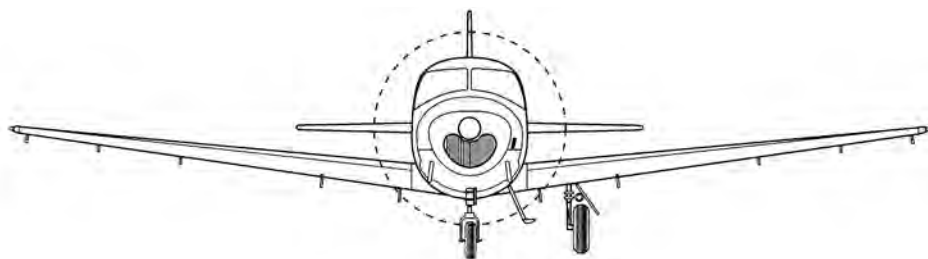
Weights: 1,945 lbs. empty, 2,950 lbs. max. takeoff.

Dimensions: Span 33 ft. 4 in., length 27 ft. 3 in., wing area 184 sq. ft.

The North American (Ryan from mid-1947) model NA-145 Navion became one of the first postwar lightplane designs to be acquired by the U.S. military services. Flying for the first time in April 1946, North American's conception of a four-place private aircraft emerged as an exceptionally clean, low-wing layout that incorporated advanced features like retractable tricycle landing gear and a sliding canopy for ingress and egress. Its all-aluminum airframe proved to be very robust, and large, fully articulating wing-flaps gave it excellent short-field performance. The U.S. Army Air Force became an early customer in late 1946 when it contracted for 83 Navions under the designation L-17A. Differences in the military version included a jettisonable canopy, additional instrumentation, and military radios. When the Army and the USAF became separate services in mid-1947, all L-17A deliveries were directed to the Army, with 47 being allocated to the Army National Guard. About the same time, due to other military production priorities, North American transferred all design and production rights on the Navion to Ryan Aeronautical.



The USAF L-17A depicted was one of the 83 originally completed by North American before production rights were transferred to Ryan in 1947. A small number remaining in ANG units in 1962 were redesignated U-18A.



North American/Ryan U-18A



In early 1948 Ryan received a contract to deliver 183 aircraft under USAF serial numbers as the L-17B. The B was externally identical to the A but included detail improvements and an upgrade to a 205-hp E-185-3 engine. Deliveries of L-17Bs in 1948 and 1949 were split between the Army and the USAF, however, historical records do not reflect the exact number allocated between them, and one Army reference indicates that 34 of them were assigned to the Army National Guard. Thirty-five L-17As, following modifications by Schweizer Aircraft Co. for installation of new brakes, auxiliary fuel tanks, and E-185-3 engines, later returned to Army



Ryan-built Army L-17B undergoing deck trials aboard the aircraft carrier USS *Leyte* in 1950. Some months later, L-17s operating from escort carriers provided forward air control (FAC) over Korea during the Inchon Invasion.

service as the L-17C. During 1951, the Army evaluated three Super Navions, powered by 260-hp Lycoming GO-435-C2 engines, initially as the L-22 and later as the XL-17D, but no production was ordered. Six Army L-17As modified as remote-control drones were re-designated QL-17A. The Navion model 72 (no designation assigned), a two-place trainer variant equipped with stick controls and stressed for aerobatics, was unsuccessfully evaluated by the USAF and the Navy in the early 1950s in competition with the Beech T-34 Mentor.

In Army service, L-17s quickly gained popularity with senior officers as staff transports, and during the Korean War, Gen. Douglas MacArthur and Maj. Gen. Matthew Ridgeway each obtained one as a personal aircraft. To provide forward observation for the Inchon amphibious invasion in September 1950, a couple of Army L-17s (without arresting gear) operated from escort carriers USS Badoeng Strait (CVE-116) and USS Sicily (CVE-118). During the early months of the Korean War, until Cessna L-19s arrived to replace them, Army L-17s fitted with rocket tubes provided artillery spotting and forward air control (FAC) for air strikes. For most of the Korean War, Army and USAF L-17s saw extensive use as staff and medical evacuation transports, however, as newer twin-engine types arrived for service (e.g., L-23, L-26, and L-27) during the mid-1950s, many L-17s were either transferred to military flying clubs or to colleges for ROTC familiarization training. A small number of L-17As, Bs, and Cs still carried on the military inventory in mid-1962 were re-designated U-18A, B, and C, respectively.

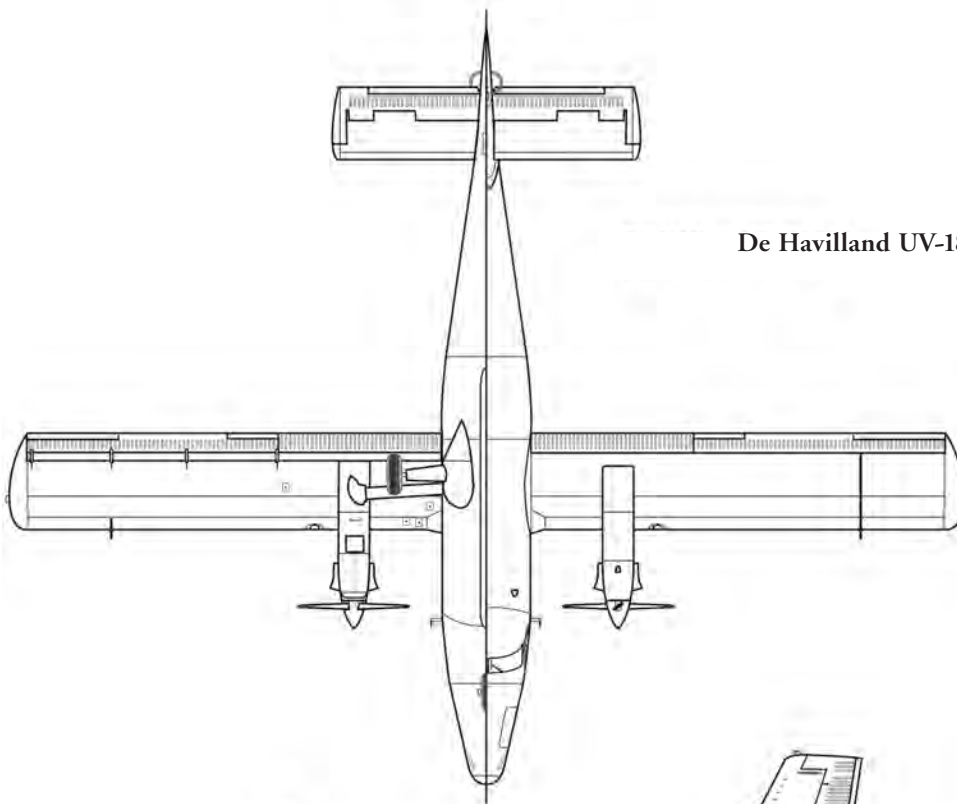
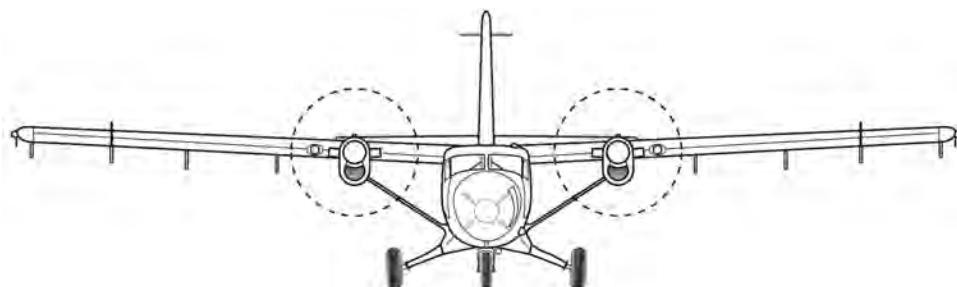
## De Havilland UV-18 Twin Otter —1976

### Technical Specifications (UV-18A)

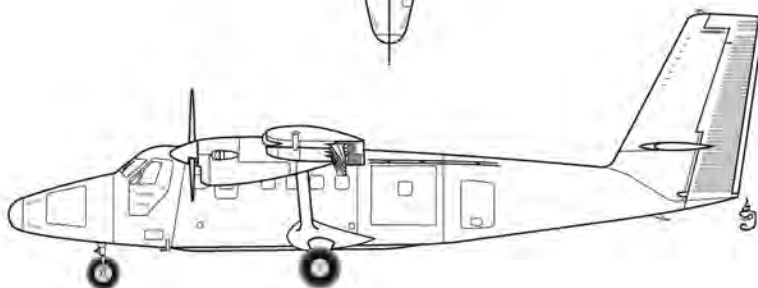
Type: Light STOL utility transport.

Manufacturer: De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada.

Total military versions: 9 (6 U.S. Army; 3 USAF).



De Havilland UV-18A







**The two Twin Otters procured by the USAF in 1977 as the UV-18B. Upon delivery, both aircraft were assigned to the U.S. Air Force Academy for parachute training.**

Capacity: Crew of two plus 18 passengers, eight medical litters, or 2,300 lbs. of cargo.

Powerplants: Two 652-shp Pratt & Whitney PT6A-27 turboprop engines driving three-bladed Hartzell constant-speed, fully reversible propellers.

Performance: Max. speed 225-mph, cruise 185-mph; ceiling 27,700 ft.; range 892 mi.

Weights: 7,415 lbs. empty, 12,500 lbs. max. takeoff.

Dimensions: Span 65 ft., length 49 ft. 6 in., wing area 420 sq. ft.

In 1964 De Havilland of Canada initiated design work on the DHC-6 Twin Otter as the logical successor to the DHC-3 Otter. Making the decision to proceed with a twin turboprop arrangement not only improved safety margins but also allowed a 50 percent increase in useful load. Flight-testing of the prototype, which commenced in May 1965, subsequently revealed the DHC-6's STOL performance to be nearly as good as that of the smaller DHC-3. Twin Otter production began in 1966 with the Series 100, followed by the Series 200 (1968) and Series 300 (1969), with 844 of all versions having been delivered when production ceased in 1988; then in mid-2006, soon after Viking Air Ltd. acquired all DHC-6 production rights, it announced plans to reopen Twin Otter production with a Series 400 and flew the first demonstrator in October 2008.

During the mid-1970s, the need for a multi-engine STOL transport capable of operating year-around in Alaska's western and northern regions, led the Alaska Army National Guard to procure six DHC-6-300s in three batches over a six-year interval, with two delivered in 1977, two in 1979, and the final two in 1982. Designated UV-18A, the six aircraft were placed in oper-

ation with the 207th Arctic Reconnaissance Group to provide administrative support and to move personnel and supplies in the affected regions. UV-18As differed from their civil counterparts in having extra fuel capacity, high-flotation wheeled landing gear, and military avionics and communications equipment. In 1977 the USAF ordered two DHC-6-300s, delivered the following year as the UV-18B, to be used for parachute training at the U.S. Air Force Academy and based at the school's airfield in Colorado Springs, Colorado. During the late 1990s, after the Alaska-based UV-18As had been replaced by Short C-23B Sherpas (see Series II, above), two of them were subsequently reassigned to the Army's Golden Knights parachute team and one transferred to the U.S. Air Force Academy to augment the two UV-18Bs.

## Stinson U-19 (L-5, OY) Sentinel—1942

### Technical Specifications (U-19A)

Type: Light liaison and utility transport.

Manufacturer: Stinson Aircraft Div., Vultee-AVCO, Wayne, Michigan.

Total military versions: 3,590 (3,128 AAF/USAF; 458 USMC; 4 USCG).

Capacity: One pilot plus one passenger, on medical litter, or 300 lbs. of cargo.

Powerplant: One 190-hp Lycoming O-435-11 6-cylinder air-cooled horizontally opposed engine driving a two-bladed Aeromatic variable-pitch wooden propeller.

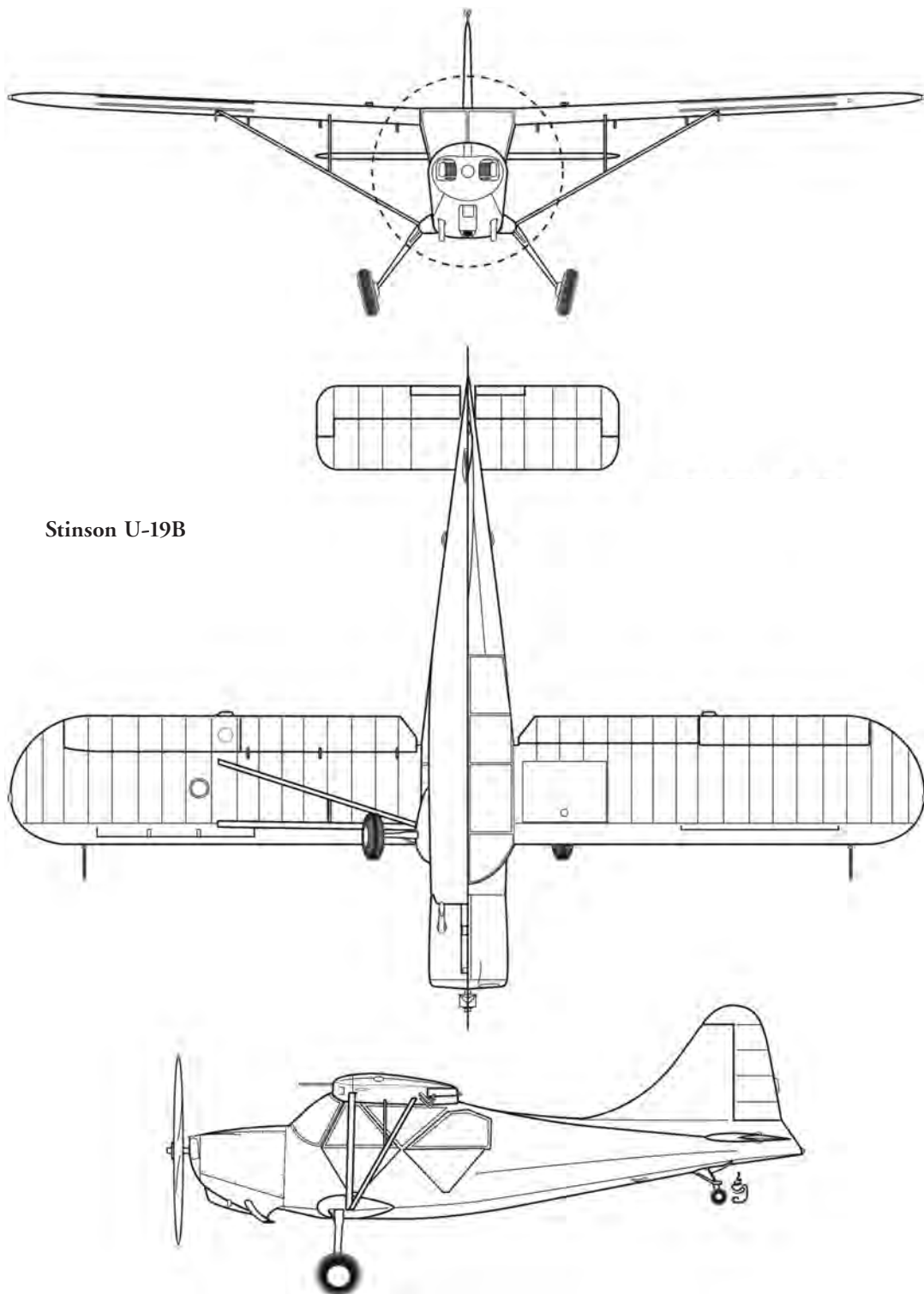
Performance: Max. speed 129-mph, cruise 110-mph; ceiling 15,600 ft.; range 360 mi.

Weights: 1,600 lbs. empty, 2,250 lbs. max. takeoff.

Dimensions: Span 34 ft., length 24 ft. 1 in., wing area 155 sq. ft.



Marine OY-2 serving with VMO-1 in the early 1950s. OY-2s corresponded to the AAF/Army L-5Es. A small number of L-5s remaining in Army in 1962 were re-designated as U-19s.



**Stinson U-19B**

Nicknamed the “Flying Jeep,” the Stinson L-5 Sentinel (originally test flown as the YO-54) holds the distinction of having been as the second most-produced (Piper L-4 was first) liaison aircraft for the U.S. military services during World War II. Though sharing some design elements with Stinson’s civil Model 105 Voyager, the L-5 emerged in 1942 as a purpose-built military aircraft with no civil counterpart. A wing incorporating fixed leading edge slots and three-position slotted flaps enabled the L-5 to fly as slow (38-mph) as the much lighter L-4. Improved variants, which began appearing in 1943, included the L-5B (USMC designation OY-1) with hinged panels on the side of the fuselage to allow loading of one medical stretcher case, the L-5C with provision for reconnaissance cameras, the L-5E (USMC OY-2) with larger tires, stronger brakes, and drooping ailerons for improved STOL performance, and finally, the L-5G with an uprated -11 engine and a variable-pitch propeller.

In their designed role of artillery spotting, forward tactical observation, and medical evacuation, L-5s saw extensive action with Army and USMC combat units in all theaters of World War II and again in Korea from 1950 to 1953. Four ex-Army L-5Bs operated by the Coast Guard in 1948 and 1949 were used to spot illegal stills for the Alcoholic Tax Unit of the U.S. Treasury Department. Although most Sentinels were withdrawn from military service during the mid- and late 1950s, a handful of L-5Gs remained on the inventory when the Tri-Service system became effective in September 1962. At least five Army examples were re-designated U-19A, and several are believed to have flown covert operations in Southeast Asia briefly during the early 1960s. One example used by the U.S. Air Force Academy as a glider tug became the U-19B.

## U-20 (see Cessna LC-126 in Series I, Part A)

### Pilatus UV-20 Chiricahua—1979

#### Technical Specifications (UV-20A)

Type: Light STOL utility transport.

Manufacturer: Pilatus Flugzeugwerke AG, Stans, Switzerland.

Total military versions: 3 (2 U.S. Army; 1 USAF).

Capacity: One pilot plus 10 passengers or 2,491 lbs. of cargo.

Powerplant: One 680-shp Pratt & Whitney PT6A-27 turboprop engine driving a three-bladed Hartzell constant-speed, fully reversible propeller.

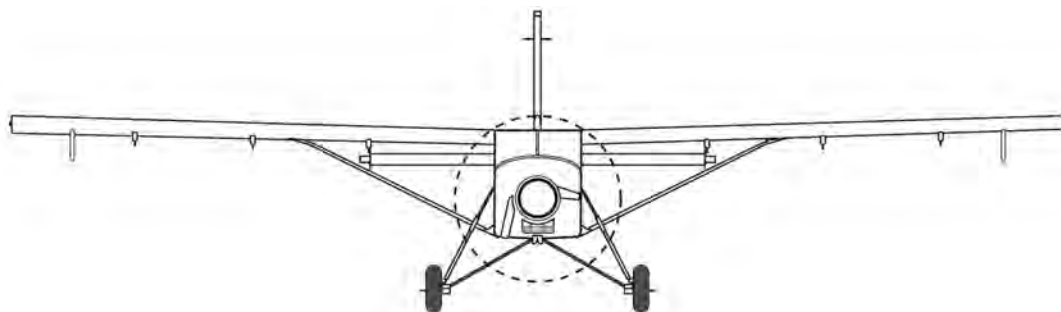
Performance: Max. speed 174-mph, cruise 132-mph; ceiling 25,000 ft.; range 850 mi.

Weights: 2,685 lbs. empty, 4,850 lbs. max. takeoff.

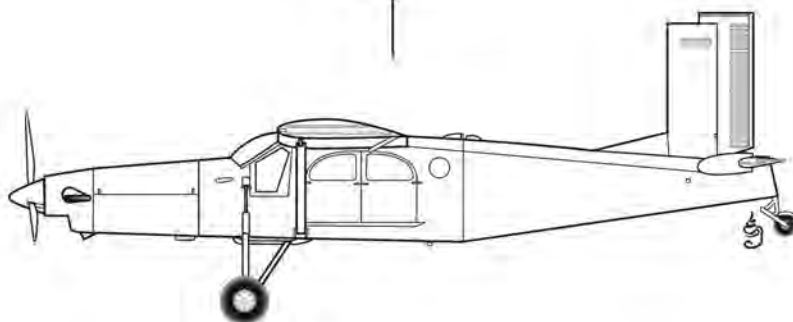
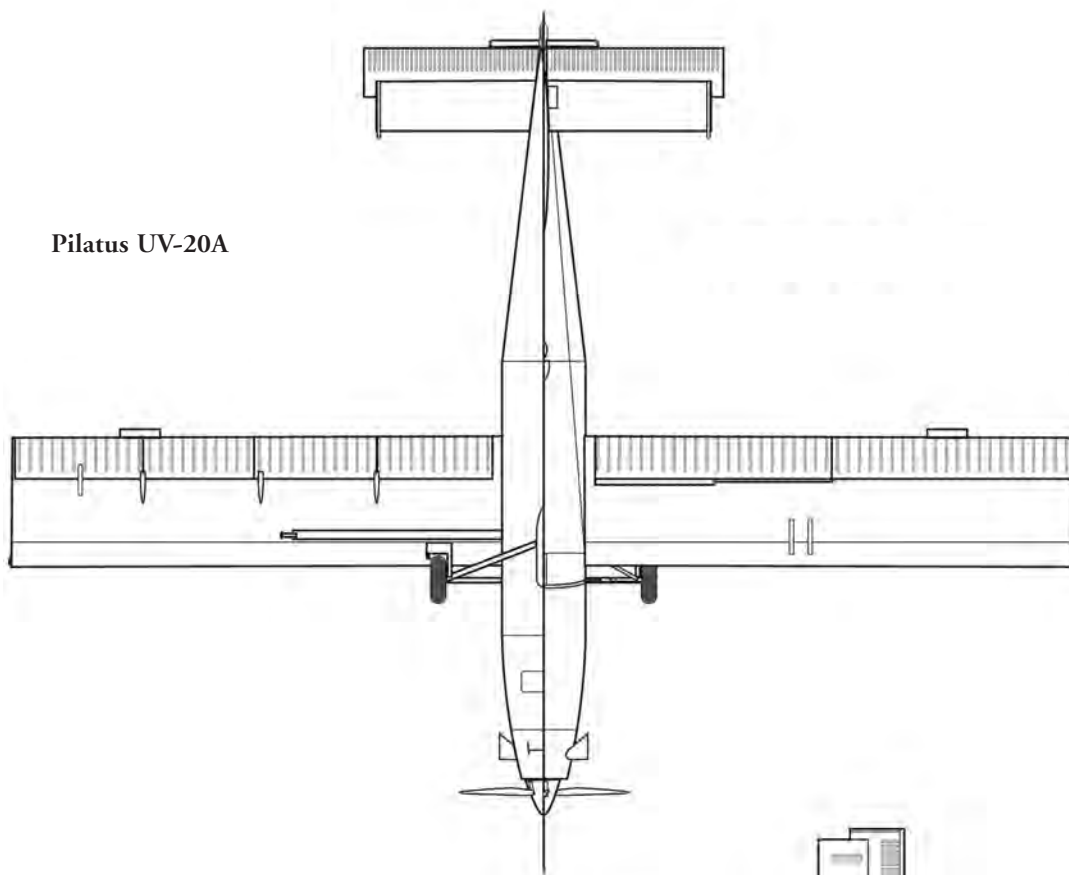
Dimensions: Span 49 ft. 8 in., length 35 ft. 9 in., wing area 310 sq. ft.

Over its 52-year history, the Swiss-built Pilatus PC-6 Porter has earned the reputation of being one of the most rugged STOL aircraft ever built. The first piston-engine Porters flew in 1959, followed by the more capable turboprop versions in 1961. The more recent PC-6B2 model (PT6A-27 engine), using a system of double-slotted flaps, can takeoff fully loaded within 640 feet and land within 427 feet, and its triple-braced, main landing gear in a tailwheel layout, enables it to operate from rough terrain closed to most other aircraft.

In 1979 the U.S. Army procured two PC-6B2s that entered service under the designation UV-20A and received the official name Chiricahua (a Native American tribe in Arizona). Upon delivery, both aircraft were assigned to the Aviation Detachment of the Berlin Brigade in Germany where they were needed to operate at low airspeeds and altitudes in very restricted airspace. In operational service, the UV-20As could be rigged to carry cargo, eleven passengers, or three medical litters with four attendants. Sometime during the 1990s, the two UV-20As were reassigned



Pilatus UV-20A







One of two Army UV-20As depicted while serving with the Aviation Detachment of the Berlin Brigade in 1979. Both aircraft were reassigned to the Golden Knights parachute team during the early 1990s (courtesy Peter Seemann).

to the Golden Knights Army Parachute team and in 2002, one was destroyed in a mid-air collision with another aircraft, and since that time, the remaining example has been withdrawn. In 1995, the USAF acquired one ex-civil PC-6B2, also designated UV-20A, which is currently serving with the 427th Special Operations Squadron at Pope AFB, North Carolina.

From the mid-1960s to the mid-1970s, Fairchild-Hiller license-built approximately 93 PC-6s that were variously powered by Garrett TPE331 and Pratt & Whitney PT6A turboprop engines. Of that total, 23 built under USAF serial numbers between 1972 and 1974 received the designation AU-23A after being completed as side-firing gunships, armed with XM-197 20-mm rotary cannons. However, once field testing revealed the AU-23As to be highly vulnerable to ground fire, they were sold to the Thai Air force.

## Beech U-21 (VC-6, T-44) Ute—1964

### Technical Specifications (U-21A)

Type: Light utility transport and electronic warfare platform.

Manufacturer: Beech Aircraft Corp., Wichita, Kansas.

Total military versions: 269 (206 U.S. Army; 2 USAF; 61 USN).

Capacity: Crew of two plus 12 troops, six medical litters, or 4,220 lbs. of cargo.

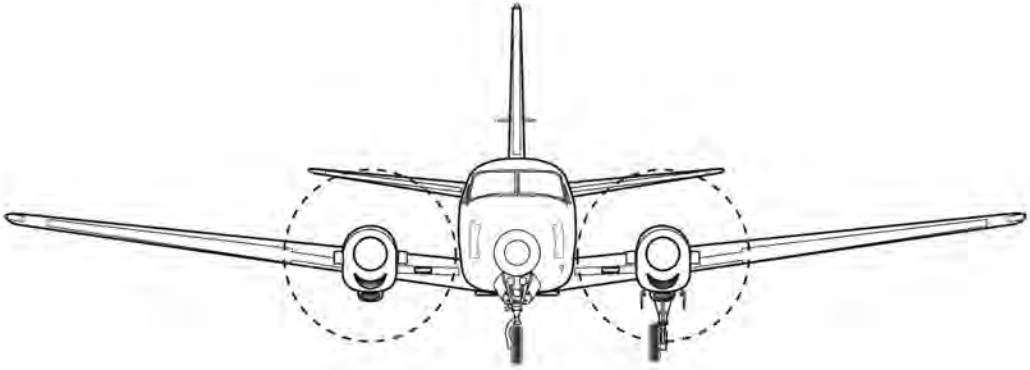
Powerplants: Two 550-shp Pratt & Whitney PT6A-20 turboprop engines driving three-bladed Hartzell constant-speed, fully reversible propellers.

Performance: Max. speed 260-mph, cruise 248-mph; ceiling 26,100 ft.; range 1,384 mi.

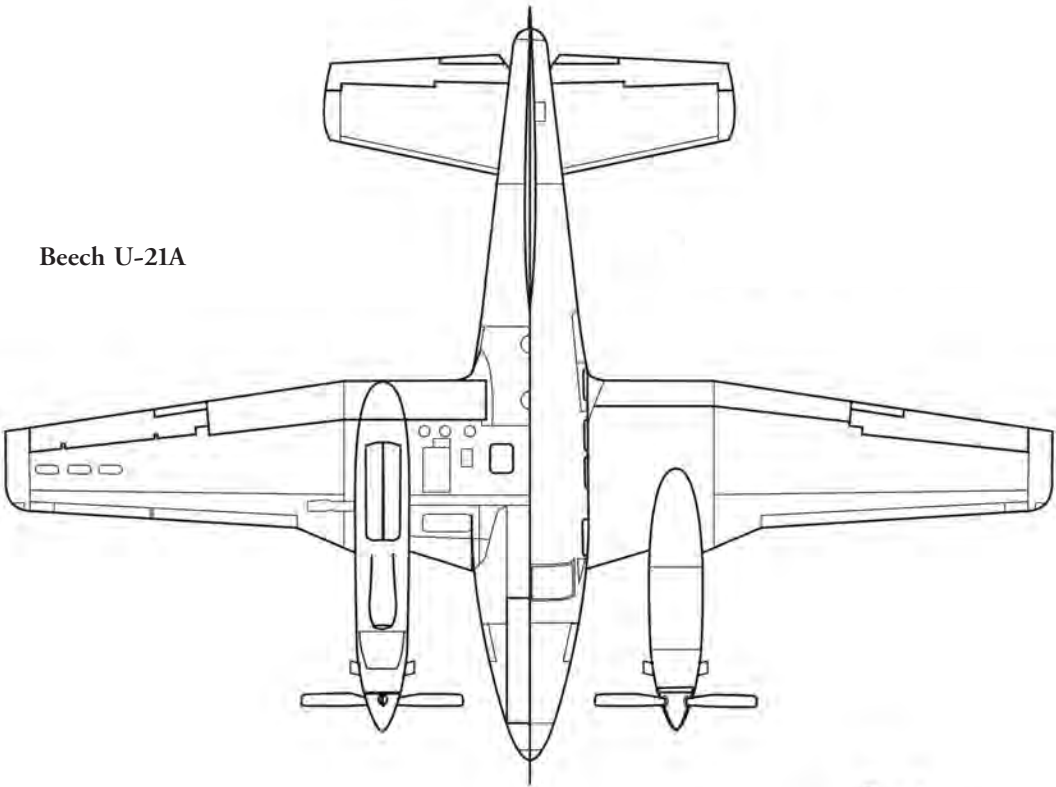
Weights: 5,300 lbs. empty, 9,650 lbs. max. takeoff.

Dimensions: Span 45 ft. 11 in., length 35 ft. 6 in., wing area 280 sq. ft.

In 1961 Beech initiated plans to develop a cabin class, turboprop-powered aircraft that would be offered to the business market as the “King Air.” Toward this end, Beech modified a



Beech U-21A





Army U-21A in post-Vietnam paint livery seen in 1977 at Tempelhoff Airport in Berlin, Germany. The last U-21As were withdrawn from Army National Guard units in the mid-1980s (courtesy Ralf Manteufel).

Queen Air model 80 (swept tail) for installation of 500-shp PT6A-6 turboprop engines and commenced flight-testing it in May 1963 as the Model 87 proof-of-concept demonstrator. When the test program ended in early 1964, Beech handed over the demonstrator to the Army for military trials, initially as the NU-8F but later re-designated YU-21. Compared to the piston-engine U-8F, the YU-21 carried half again the payload while cruising 25 percent faster and offered much better single-engine safety margins. Under nine contracts awarded in 1966 and 1967, Beech manufactured a total of 140 aircraft for the Army as the U-21A Ute, with initial deliveries early 1967. Manufactured as factory model 65-A90, the U-21A represented a hybrid that combined the unpressurized fuselage of a Queen Air model 80 with the engines and nacelles of a King Air model 90. Extra military features included an enlarged, left-side cargo door and an interior that could be configured for over 4,000 lbs. of cargo, 12 combat-equipped troops, or six medical evacuees.

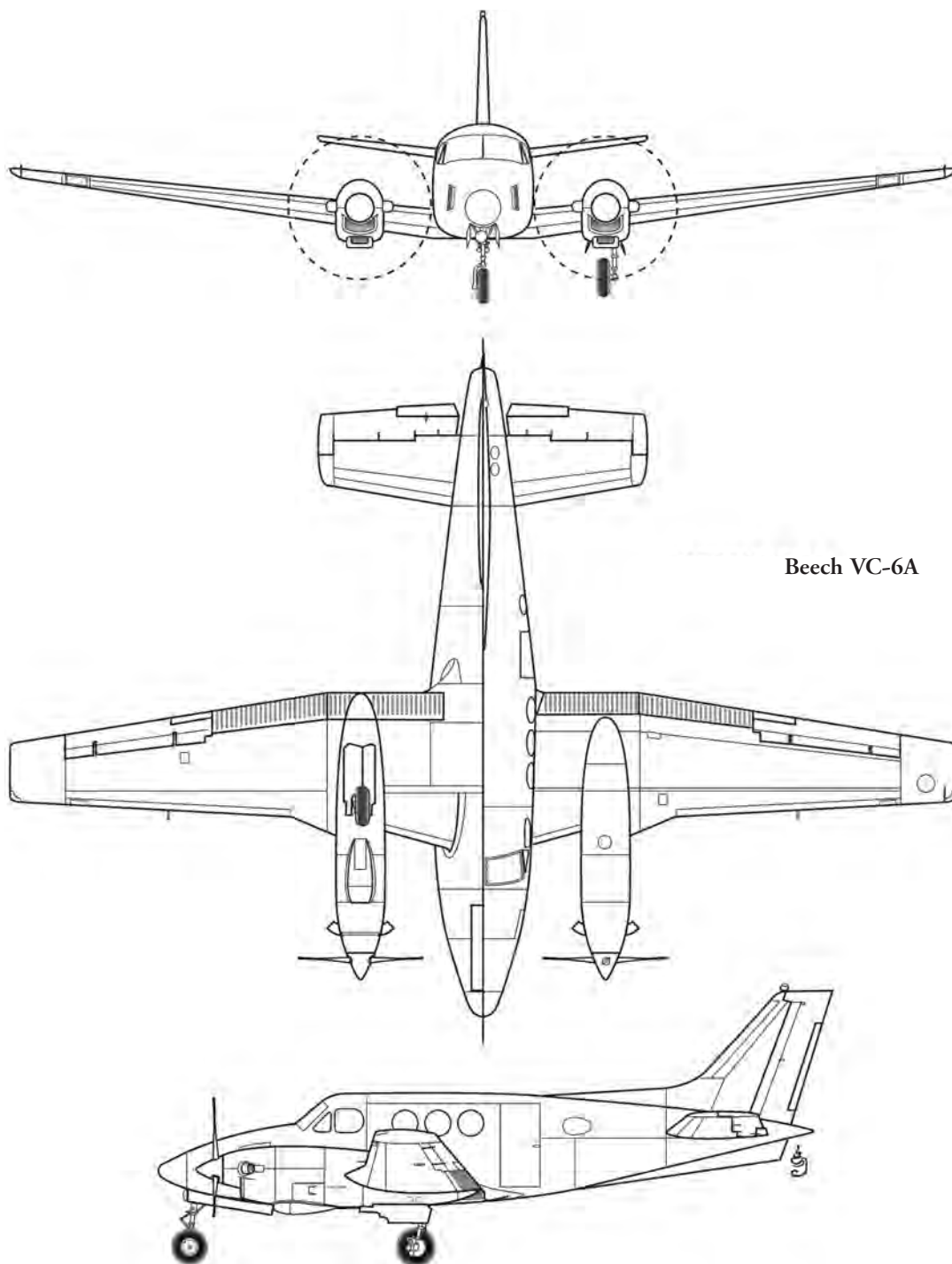
In service, a number of U-21As received modifications for specialized duties: four with dedicated electronic warfare and SIGINT equipment as the EU-21A; one as a direction finding system testbed as the JU-21A; four with “left jab” SIGINT systems as the RU-21A; and three with 620-shp PT6A-29 engines and ECM systems as the RU-21B. From 1967 to 1970, the Army also procured 40 new-build model 65-A90s for specialized roles: two similar to the RU-21B, but with revised antennas, as the RU-21C; 22 with new ECM systems (including 19 U-21As modified to the same standard) as the RU-21D; and 16 upgraded with -29 engines and SIGINT systems as the RU-21E. Five King Air model A100s (680-shp -28 engines), the Army’s first pressurized type of aircraft, were purchased off-the-shelf in 1970 as non-combat staff transports under the designation U-21F. Also in 1970, 17 unpressurized model 65-A90s ordered with new avionics and detail changes entered service as the U-21G. During the early 1970s, 21 RU-21Ds, RU-21Es, and U-21Gs became the RU-21H after being fitted with -29 engines and Guardrail



**One of 22 antenna-equipped RU-21Ds delivered to the Army between 1967 and 1970 for electronic warfare in Southeast Asia. Most were later upgraded with new electronics and engines as the RU-21H.**

SIGINT systems. In 1974, three Super King Air A200s (see C-12 in Series II, above) equipped with SIGINT systems received the designation RU-21J. Two pressurized commercial model B90 King Airs acquired in 1966 under the designation VC-6A both entered service with the USAF. In 1977 Beech began deliveries of 61 B90s to the Navy as T-44A Pegasus multi-engine trainers, and since that time, 25 with upgraded avionics have been re-designated T-44C.

As U-21As began reaching Army units during 1967, they were promptly deployed to South Vietnam where they took the place of older aircraft (e.g., U-1s and U-8s) to provide intra-theater tactical support to combat units. Utes modified for specialized missions — EU-21As and RU-21As, Bs, Cs, and Ds — saw extensive use in the Southeast Asia in their roles as airborne electronic warfare platforms. Both USAF VC-6As were assigned to the 89th Airlift Wing's Presidential Flight and used primarily by President Johnson and the First Lady to commute to and from their ranch in Texas. During the 1970s a number of the U-21s modified for electronic warfare were converted back to their utility transport configuration as the U-21A; and after similar conversions, the three RU-21Js became C-12Ls. The Army began the process of replacing its Utes with C-12 Hurons (military variants of the A200 Super King Air) in the late 1970s, and the very last U-21As were withdrawn from Army National Guard units in the mid-1980s. The five pressurized U-21Fs, which served as Army VIP and staff transports, are thought to have remained in service through the 1990s, possibly longer, though none appear on the current inventory. As they were delivered from 1977 to 1980, the T-44As entered service with the Naval Pilot Training Program at NAS Corpus Christi, Texas, and 52 examples, including the 25 upgraded as T-44Cs, are listed as active as of mid-2011.



**Beech VC-6A**





One of two USAF VC-6As procured for the 89th Airlift Wing's Presidential Flight in 1966. These VIP-configured aircraft were based upon the pressurized King Air B90.

**U-22:** Designation applied to modified variants of the Beech model D33 Debonair. Sixty-three delivered as QA-22A/B unmanned target drones and one YAU-22B ground attack prototype.

**U-23** (see UV-20, above)

**U-24:** Designation applied to gunship variant of Helio HST-550 Stallion. Eighteen built as AU-24A and sold to Cambodian Air Force.

**U-25:** Designation applied to Coast Guard maritime surveillance variant of Dassault Falcon 20. Forty-one delivered as HU-25A.

**U-26:** Designation applied to one Cessna 206 Stationair confiscated by DEA and assigned to U.S. Customs under a military serial number as the U-26A.

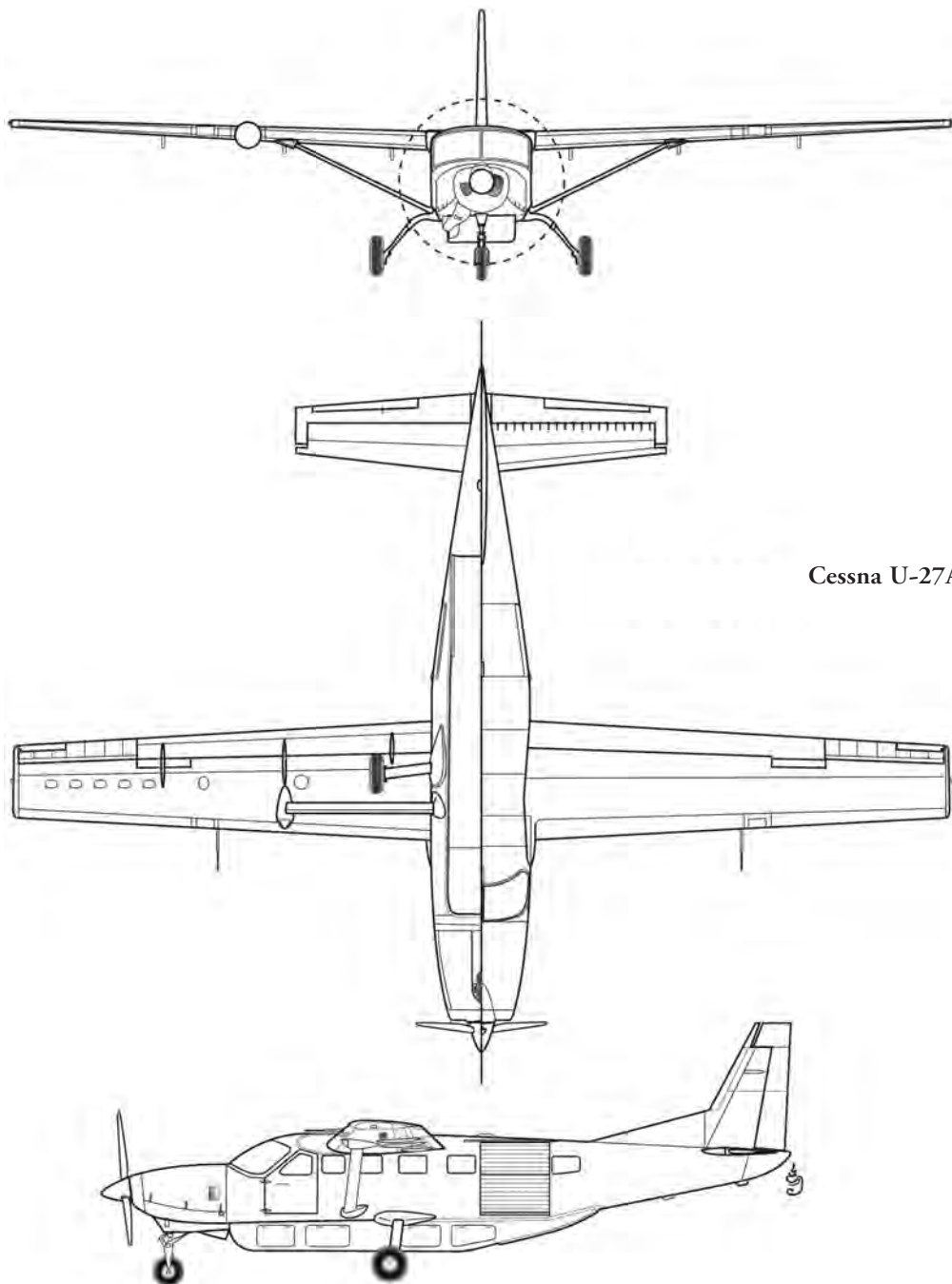
## Cessna U-27 Caravan —1986

### Technical Specifications (U-27A)

Type: Light utility transport.

Manufacturer: Cessna Aircraft Co., Wichita, Kansas.

Total military versions: 1 (U.S. Army/USAF).



Cessna U-27A



**U-27A in Columbian Air Force markings as seen in Grand Junction, Colorado, in 2001. Similar models are thought to be in service with the USAF, though none appear in serial number records (courtesy Andrew Ozanne).**

Capacity: One pilot plus nine passengers or 3,400 lbs. of cargo.

Powerplant: One 600-shp Pratt & Whitney PT6A-114 turboprop engine driving a three-bladed McCauley constant-speed, fully reversible propeller.

Performance: Max. cruise speed 212-mph; ceiling 27,700 ft.; range 1,116 mi.

Weights: 3,862 lbs. empty, 8,000 lbs. max. takeoff

Dimensions: Span 52 ft. 1 in., length 37 ft. 6 in., wing area 279 sq. ft.

The Cessna model 208 Caravan flew for the first time in September 1982 and approximately 2,000 examples have been sold since production started in 1984. Caravans have been sold in two principal versions: the model 208A and the stretched model 208B, available in passenger, all-cargo, or combination passenger-cargo versions. Caravans can also be converted to skis or floats, and though technically not a STOL design, are capable of rough-field operations. Under the Department of Defense designation U-27A, one 208A was reportedly evaluated by the U.S. military in 1986 as a light, intra-theater tactical transport but was apparently returned to Cessna when no orders were forthcoming. A number of Caravans have been sold to foreign air forces, and most recently, in 2009 and 2010, at least five 208Bs have been acquired by the new Iraqi Air Force for counter-insurgency missions.

## Pilatus U-28 — 2005

### Technical Specifications (U-28A)

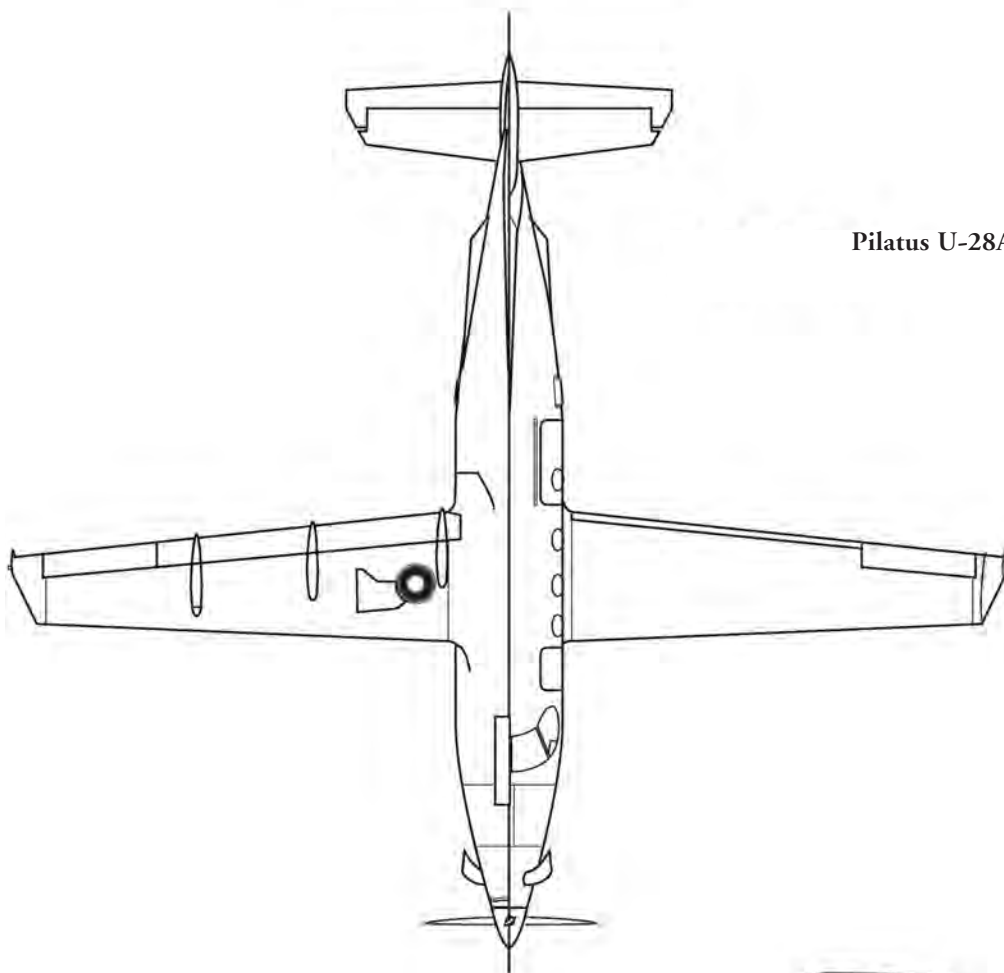
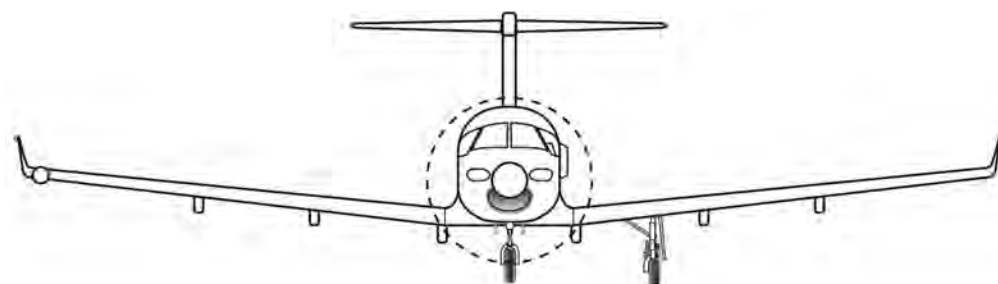
Type: Light utility transport.

Manufacturer: Pilatus Flugzeugwerke AG, Stans, Switzerland.

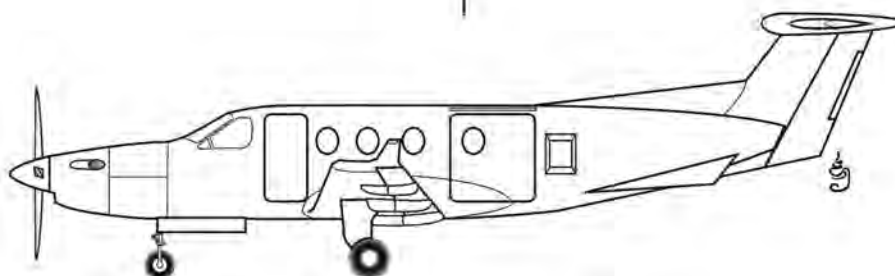
Total military versions: 10 (USAF).

Capacity: One pilot plus nine passengers or 3,500 lbs of cargo.

Powerplant: One 1,200-shp Pratt & Whitney PT6A-67B turboprop engine driving a four-bladed Hartzell constant-speed, fully reversible propeller.



**Pilatus U-28A**





**USAF U-28B seen just before touchdown at Lajes AFB, Azores, in 2010. Ten U-28As and three U-28Bs are reported to operating with three squadrons attached to Air Force Special Operations Command (courtesy Leandro Rocha).**

Performance: Max. cruise speed 312-mph; ceiling 30,000 ft.; range 1,739 mi.

Weights: 5,867 lbs. empty, 10,450 lbs. max. takeoff

Dimensions: Span 53 ft. 3 in., length 47 ft. 3 in., wing area 278 sq. ft.

The Swiss-built Pilatus PC-12 made its debut on the U.S. civil market in 1994, available in nine-passenger airliner, four-passenger cargo-combi, and six-seat business versions, and at the date of this writing, more than 1,000 examples have been sold worldwide. In 2004 the USAF ordered one PC-12 to be evaluated for intra-theater logistics support of special operations forces under the designation U-28A. In a low-intensity conflict scenario, the single-engine U-28A can carry a 3,500 lb. payload out of relatively short airfields (2,300 feet), travel between destinations at over 300-mph, and operate at costs about 30 percent less than comparable multi-engine aircraft. Since that time, the USAF has procured nine more U-28As, six in 2005 and three in 2007. Also, in 2007 and 2009, the USAF purchased three PC-12s as the U-28B. While no details have been published about the U-28B, recent internet photographs indicate a different antenna arrangement and fewer side windows. Since 2005, U-28As and Bs have become operational with three different Special Operations Squadrons (SOS) as part of AFSOC: the 319th SOS and 34th SOS at Hurlburt Field, Florida and the 318th SOS at Cannon AFB, New Mexico.

## **Antonov An-2 — 1991**

### **Technical Specifications (An-2)**

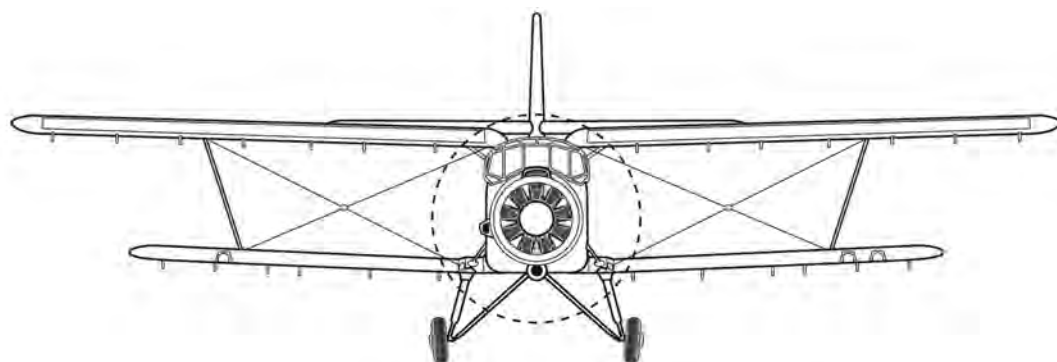
Type: Light STOL utility transport.

Manufacturer: Antonov OKB, Kiev, Ukraine; Państwowe Zakłady Lotnicze (PZL), Warsaw, Poland; and Hongdu Aviation Industry (Group), Nanchang, China.

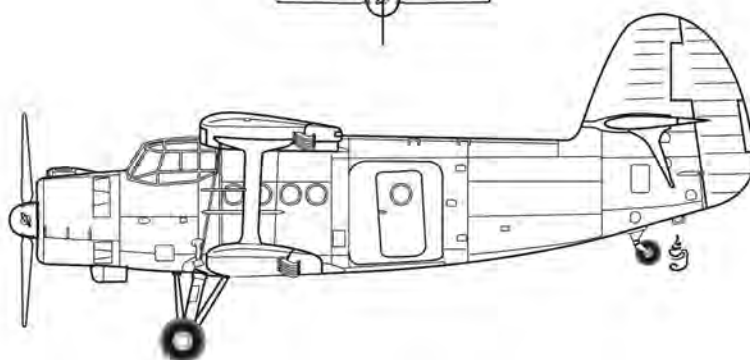
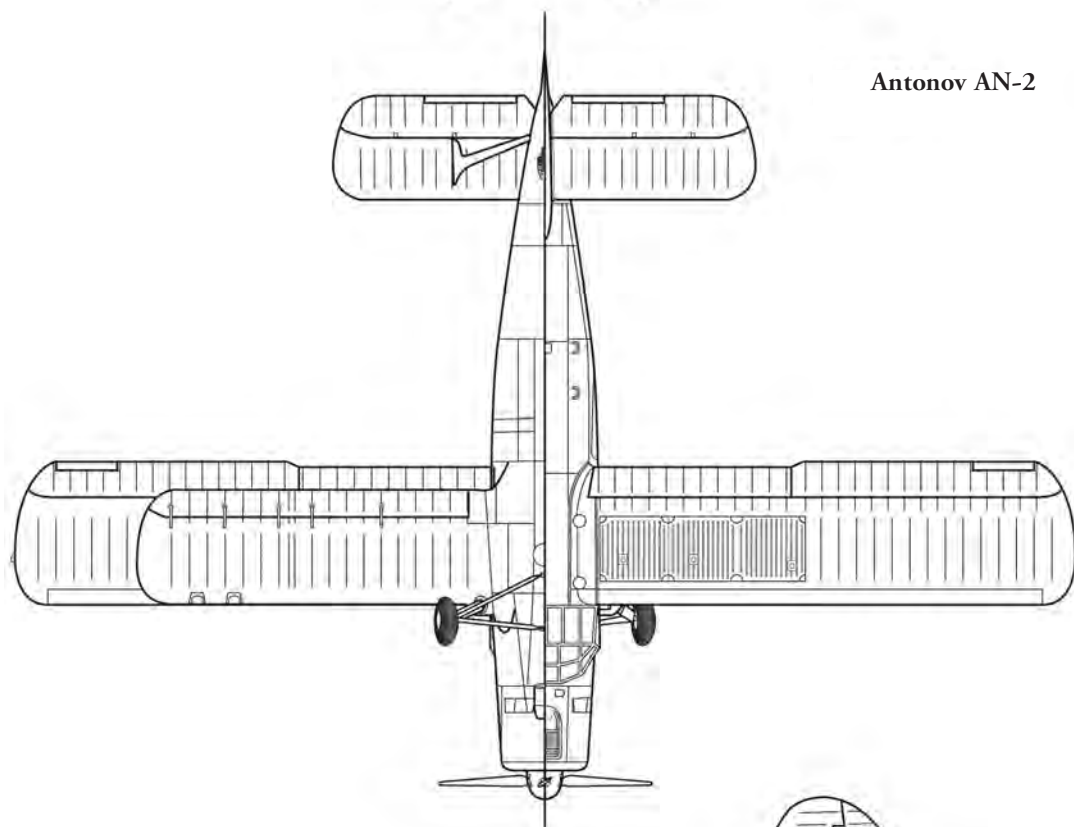
Total military versions: 2 (USAF).

Capacity: Crew of one or two plus 10 passengers or 3,300 lbs. of cargo.





**Antonov AN-2**





**Hungarian-registered An-2 seen in 2011 at the Old Warden Airdrome in England. At least one An-2 is reported to be serving with the 16th Special Operations Wing at Hurlburt Field, Florida.**

Powerplant: One 1,000-hp Shvetsov ASh-62IR supercharged 9-cylinder radial engine driving a four-bladed AW-2 variable-pitch propeller.

Performance: Max. speed 160-mph, cruise 120-mph; ceiling 14,750 ft.; range 525 mi.

Weights: 7,300 lbs. empty, 12,000 lbs. max. takeoff.

Dimensions: Span 59 ft. 8 in., length 40 ft. 8 in., wing area 770 sq. ft.

Until recently overtaken by the Lockheed C-130, the Antonov An-2 held the record for the longest production run of a military aircraft (1947–2001) and is also recognized as having been the largest single-engine biplane ever placed in mass production. Conceived as a single-bay biplane of fabric-covered, all-metal construction and powered by the Russian copy of the Wright *Cyclone* engine, the An-2 had originally been designed to meet broad civil and military requirements for agricultural and utility transport applications over the varied territories of the Soviet Union. The expansive wing area of the biplane layout gives the An-2 a respectable 2,800 lb. payload, and a system of automatic leading-edge slats plus upper and lower trailing-edge flaps permits takeoffs and landings within about 700 feet. For added versatility in wilderness areas and cold climates, it may be rigged to operate with floats or skis. Known for many years under the NATO code-name “Colt,” An-2s have been used in diverse military roles such as dropping paratroops and supplies, moving cargos and personnel, evacuating wounded, and in some cases, attacking targets with gunfire and bombs.

Serial number records indicate that the U.S. Army acquired two An-2s in 1991, one of which was listed as having been used for parachute exercises at Nellis AFB, Nevada. Both aircraft were transferred to the USAF under new serial numbers in 1995, and as of mid-2011, one of the An-2s is reported as still serving with the 16th Special Operations Wing at Hurlburt Field in Florida. According to one unverified source, foreign aircraft like the An-2, are used to insert and extract Special Forces teams in certain countries in order to avoid attracting attention.

## Antonov An-26 — 2003

### Technical Specifications (An-26)

Type: Tactical and logistical transport.

Manufacturer: Antonov OKB, Kiev, Ukraine.

Total military versions: 3 (USAF).

Capacity: Crew of five plus 40 troops, 24 medical litters, or 12,125 lbs. of cargo.

Powerplants: Two 2,820-shp Progress AI-24VT turboprop engines driving four-bladed constant-speed, fully reversible propellers and one Tumansky RU19-A300 turbojet engine in right nacelle for APU and climb thrust, rated at 1,795 lbs./s.t.

Performance: Max. cruise speed 273-mph; ceiling 24,600 ft.; range 1,584 mi.

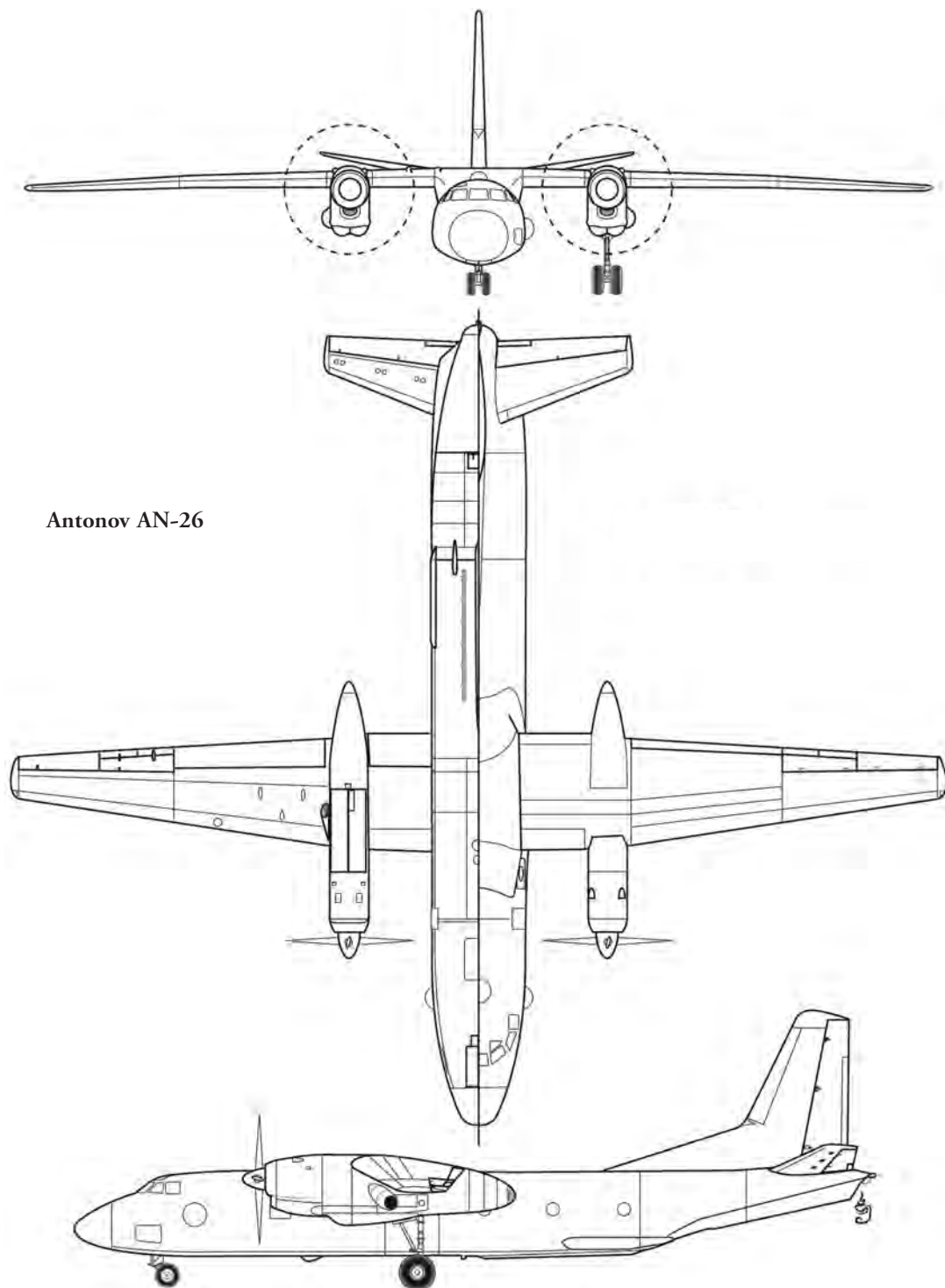
Weights: 33,113 lbs. empty, 52,911 lbs. max. takeoff.

Dimensions: Span 95 ft. 10 in., length 78 ft. 1 in., wing area 807 sq. ft.

The Antonov An-26 first appeared in 1968 as a tactical transport variant of the An-24 medium range airliner and cargo transport. In addition to the former Soviet Union, many of the 1,403 An-26s built were supplied to the air forces of approximately 35 foreign nations and is still operational with some of them. From 2003 to 2007 three An-26s were assigned to the USAF's 6th Special Operations Squadron based at Hurlbert Field, Florida. While no operational details are available, these aircraft may have been used in the Middle East where they would have blended-in with An-26s serving with the air forces of Afghanistan and Iraq. One internet source (see <http://www.spyflight.co.uk/CIA.htm>) indicates that at least one An-32, a re-engined



An-26 in markings of Afghan National Army Air Corps as seen at Kabul Air Base in late 2007. At least three An-26s are known to have operated with the USAF's 6th Special Operations Squadron.



**Antonov AN-26**

improvement of the An-26, is currently serving with the 16th Special Operations Wing at Hurlbert Field.

## De Havilland/Bombardier DHC-8 (E-9)—1988

### Technical Specifications (DHC-8-200)

Type: Light personnel and logistical transport.

Manufacturer: De Havilland of Canada, Downsview, Ontario, Canada.

Total military versions: Not published (USAF).

Capacity: Crew of two plus 37 passengers or 7,511 lbs. of cargo.

Powerplants: Two 2,150-shp Pratt & Whitney PW123C turboprop engines driving four-bladed Hamilton Standard constant-speed, fully reversible propellers.

Performance: Max. cruise speed 334-mph; ceiling 25,000 ft.; range 1,065 mi.

Weights: 23,111 lbs. empty, 36,300 lbs. max. takeoff

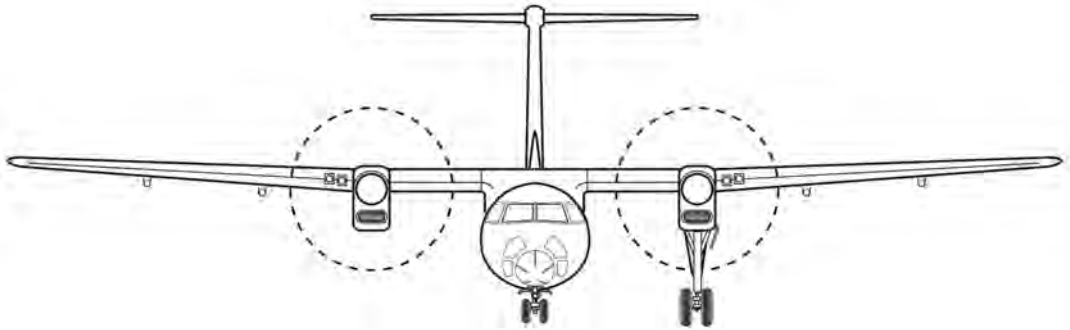
Dimensions: Span 84 ft. 11 in., length 73 ft., wing area 585 sq. ft.

De Havilland of Canada launched production of its DHC-8-100 (“Dash-8”) in 1984 in response to commercial demand for a new generation of turboprop-powered commuter airliners. While sharing some similarities with the four-engine DHC-7, the design of the twin-engine Dash-8 had been optimized for maximum operating efficiency rather than STOL performance. In 1989, DHC added the 300 series with an 11-foot fuselage stretch, and then in 1995, after a change in corporate ownership, Bombardier introduced the 200 series (same dimensions as 100) with upgraded engines and avionics, followed in 2000 by the Q400 series with a 37-foot fuselage stretch. Series 200 production ceased in 2009.

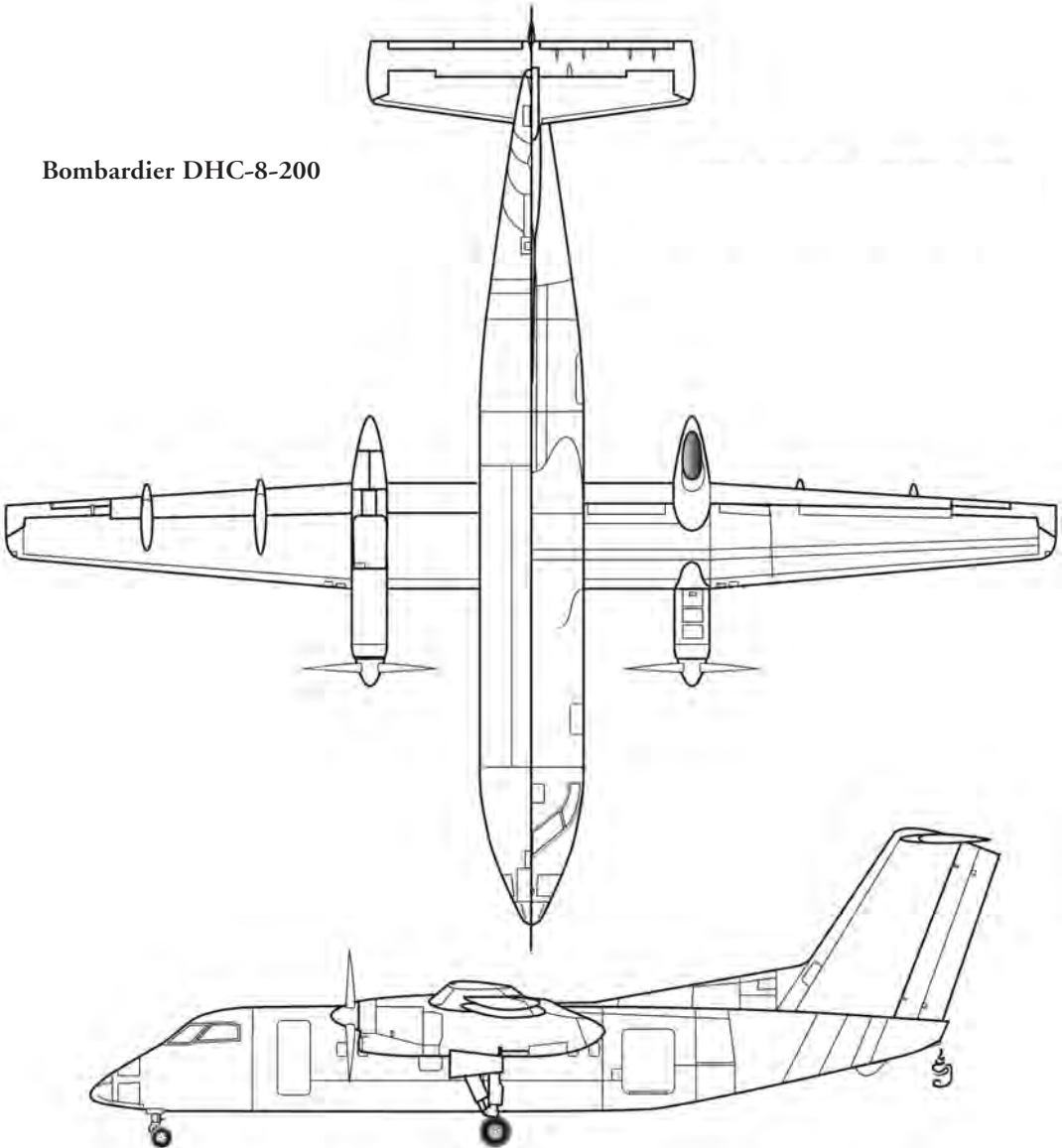


Civilian-registered (N8200H) DHC-8 in U.S. Army markings seen at Glasgow Internal Airport, Scotland, in early 2012. The military assignment of the aircraft is not known (courtesy Kenny Williamson).





**Bombardier DHC-8-200**



The first U.S. military acquisition of the Dash-8 came in 1988 when the USAF acquired two ex-civil DHC-8-100s that were modified to serve as air-to-air weapons range control aircraft under the designation E-9A. Readily identifiable by fuselage pods containing surveillance radars, both E-9As are operated by ANG aircrews as part of the 82nd Aerial Targets Squadron at Tyndall AFB, Florida. More recently, an unspecified number of ex-civil DHC-8-200s have been placed in service with the 524th Special Operations Squadron out of Cannon AFB, New Mexico. Although flown and maintained by USAF personnel, these Dash-8s retain civilian markings and registration and are reportedly leased to the Department of Defense for the purpose of delivering cargos and passengers between Europe and Africa.

## Let L-410 Turbolet — 2002

### Technical Specifications (L-410A)

Type: Light utility transport.

Manufacturer: Let Kunovice, A.S., Kunovice, Czech Republic.

Total military versions: 1 (U.S. Army).

Capacity: Crew of two plus 17 passengers or 3,100 lbs. of cargo.

Powerplant: Two 750-shp Walter M601-E turboprop engines driving four-bladed Avia constant-speed, fully reversible propellers.

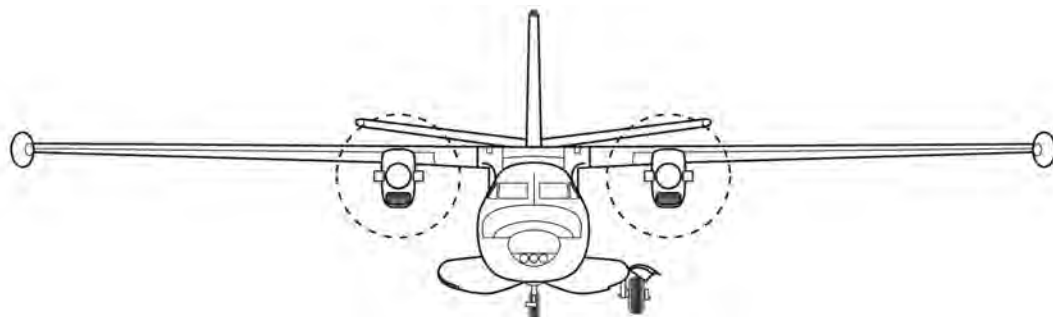
Performance: Max. cruise speed 242-mph; ceiling 24,300 ft.; range 583 mi.

Weights: 8,363 lbs. empty, 14,550 lbs. max. takeoff.

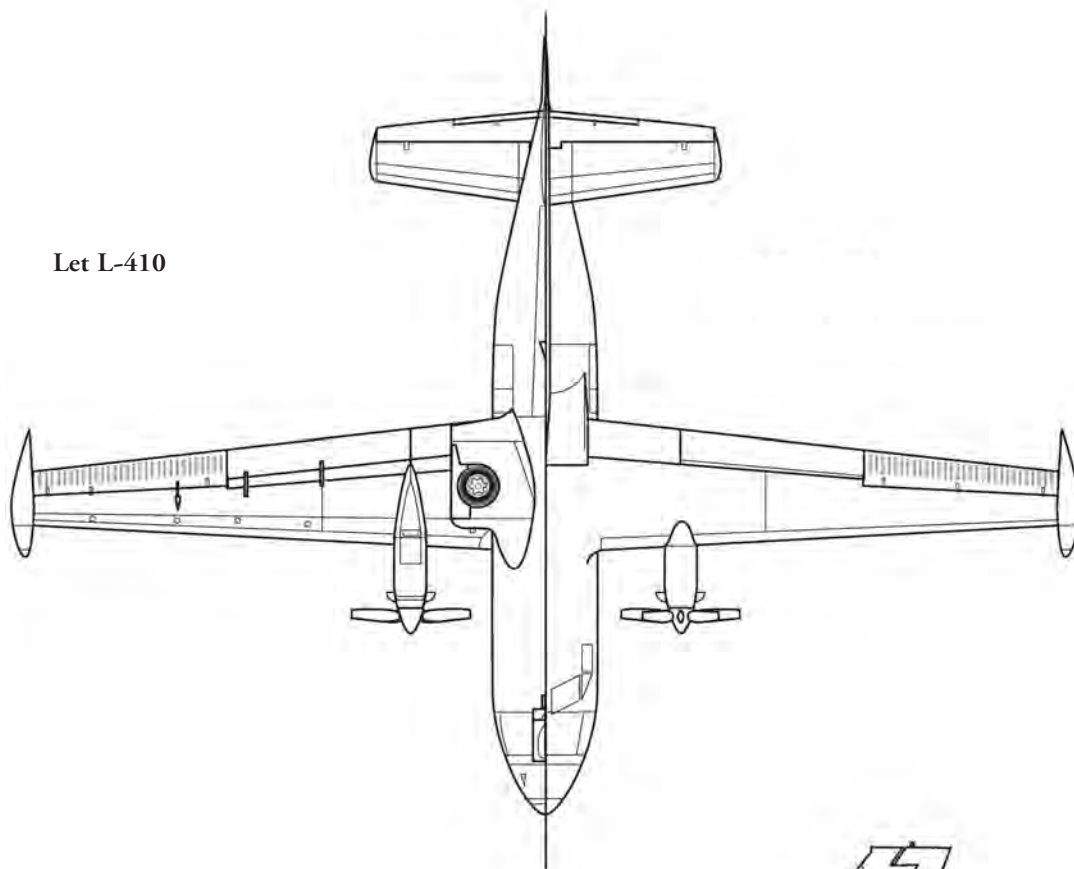
Dimensions: Span 65 ft. 7 in., length 47 ft. 4 in., wing area 375 sq. ft.



Czech Republic Air Force L-410T seen at Kunovice Airport in late 2011. Though no photograph is available, the Army acquired an L-410 in 2002 that is or was based at Biggs Army Airfield near Fort Bliss, Texas (courtesy Ondřej Smrtka).



Let L-410



At the behest of the Soviet and Warsaw Pact Air Forces, Let Kunovice, then a state-owned Czechoslovakian aircraft industry, commenced development of the L-410 in the late 1960s as a modern, twin-turboprop replacement for the Antonov An-2 (see above). The L-410 prototype flew for the first time in early 1969 and initial deliveries of production models to Soviet and Eastern Bloc air carriers and military units began in 1971. Since the collapse of the Soviet Union and the Warsaw Pact in the early 1990s, L-410 production, in a succession of improved variants, has continued in the independent Czech Republic. The current L-410UPV-E version, offering improved STOL performance, five-bladed propellers, additional fuel storage in wing tip tanks, and modernized avionics, has been certificated for commercial operations in the U.S.

Serial number records reflect the U.S. Army acquired one L-410 in early 2000 that was based at Biggs Army Airfield as part of the large Fort Bliss military complex in Texas and New Mexico. It was apparently withdrawn in 2002. Although no operational details are available, the base, which has since closed, is known to have been a major training and deployment center for troops bound for Afghanistan and Iraq during the period mentioned.

## PZL M-28 Skytruck — 2008

### Technical Specifications (M-28B)

Type: Light STOL utility transport.

Manufacturer: PZL Mielec (Polskie Zakłady Lotnicze), SA. (acquired by Sikorsky Aircraft Corp. in 2007), Mielec, Poland.

Total military versions: 10 (USAF).

Capacity: Crew of two plus 19 passengers or 4,409 lbs. of cargo.

Powerplant: Two 1,100-shp Pratt & Whitney PT6A-65B turboprop engines driving five-bladed Hartzell constant-speed, fully reversible propellers.

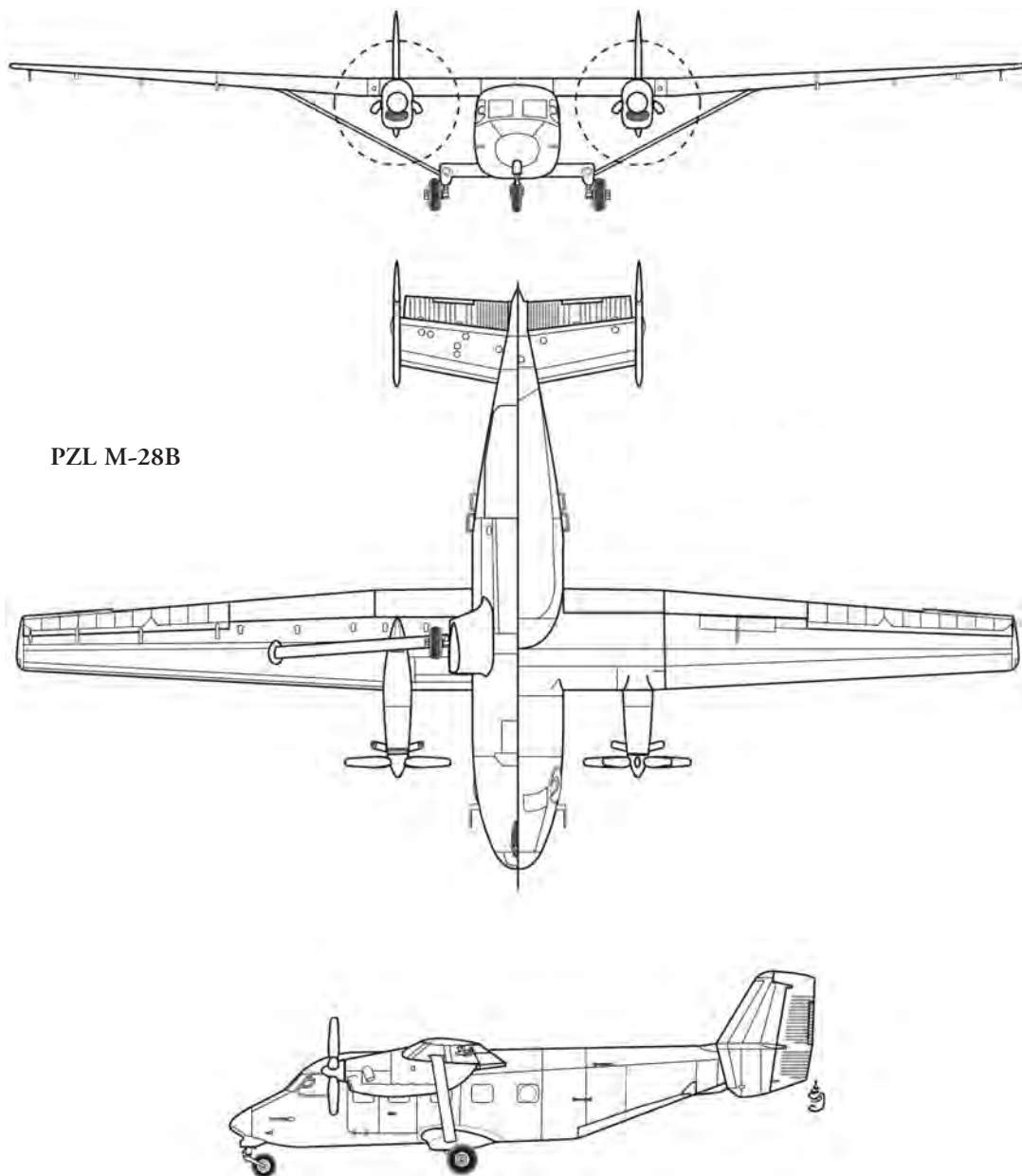
Performance: Max. speed 220-mph, cruise 168-mph; ceiling 25,000 ft.; range 932 mi.

Weights: 9,309 lbs. empty, 16,534 lbs. max. takeoff.

Dimensions: Span 72 ft. 5 in., length 43 ft., wing area 428 sq. ft.



M-28B in U.S. civil registration shown at Naples Municipal Airport, Florida, in 2005. According to serial number records, this aircraft was placed on the USAF inventory in 2009 (courtesy Erick Stamm).



The origins of the M-28 are traceable to 1978 when all production of the Soviet-designed Antonov An-28 was transferred to Poland's state-run PZL Mielec plant. Generally similar in layout to the Short C-23 (see above), the design is characterized by a high-aspect ratio, strut-braced wing, twin-fin empennage, and fixed, tricycle landing gear. Above-average STOL capability is achieved by automatic leading-edge slats and double-slotted flaps that render the aircraft virtually stall-proof, and in the event of engine loss, a spoiler automatically deploys from the opposite wing to limit wing drop. Cargo access is through a rear ramp, and the interior can be quickly configured to accommodate either passengers or freight. In 1993, several years after Poland's withdrawal from the Soviet Bloc, PZL Mielec started marketing its own M-28, a much-



modernized An-28 variant that featured Pratt & Whitney engines, Hartzell propellers, and a western avionics suite, followed in 2000 by the M-28B with -65B engines, five-bladed propellers, and better avionics.

In 2009, two years after the Sikorsky acquisition, the U.S. Department of Defense gave PZL Mielec an order for 10 M-28Bs to be delivered to Air Force Special Operations Command (AFSOC). Since that time, the USAF has officially announced that the M-28s are operating with the 318th Special Operations Squadron at Cannon AFB, New Mexico, where they are used to train, execute and otherwise support joint (e.g., Army SF, Delta Force, and Navy DEVGRU) special operations forces worldwide.

## Lockheed Martin X-55 — 2009

### Technical Specifications (X-55A)

Type: Experimental cargo aircraft technology demonstrator.

Manufacturer: Lockheed Martin Corp. Palmdale, California.

Total military versions: 1 (USAF).

Capacity (328Jet): Crew of two plus 32 passengers or 7,716 lbs. of cargo.

Powerplants: Two Pratt & Whitney PW306-B turbofan engines, each rated at 6,050 lbs./s.t.

Performance (328Jet): Max. cruise speed 466-mph; ceiling 35,000 ft.; range 2,300 mi.

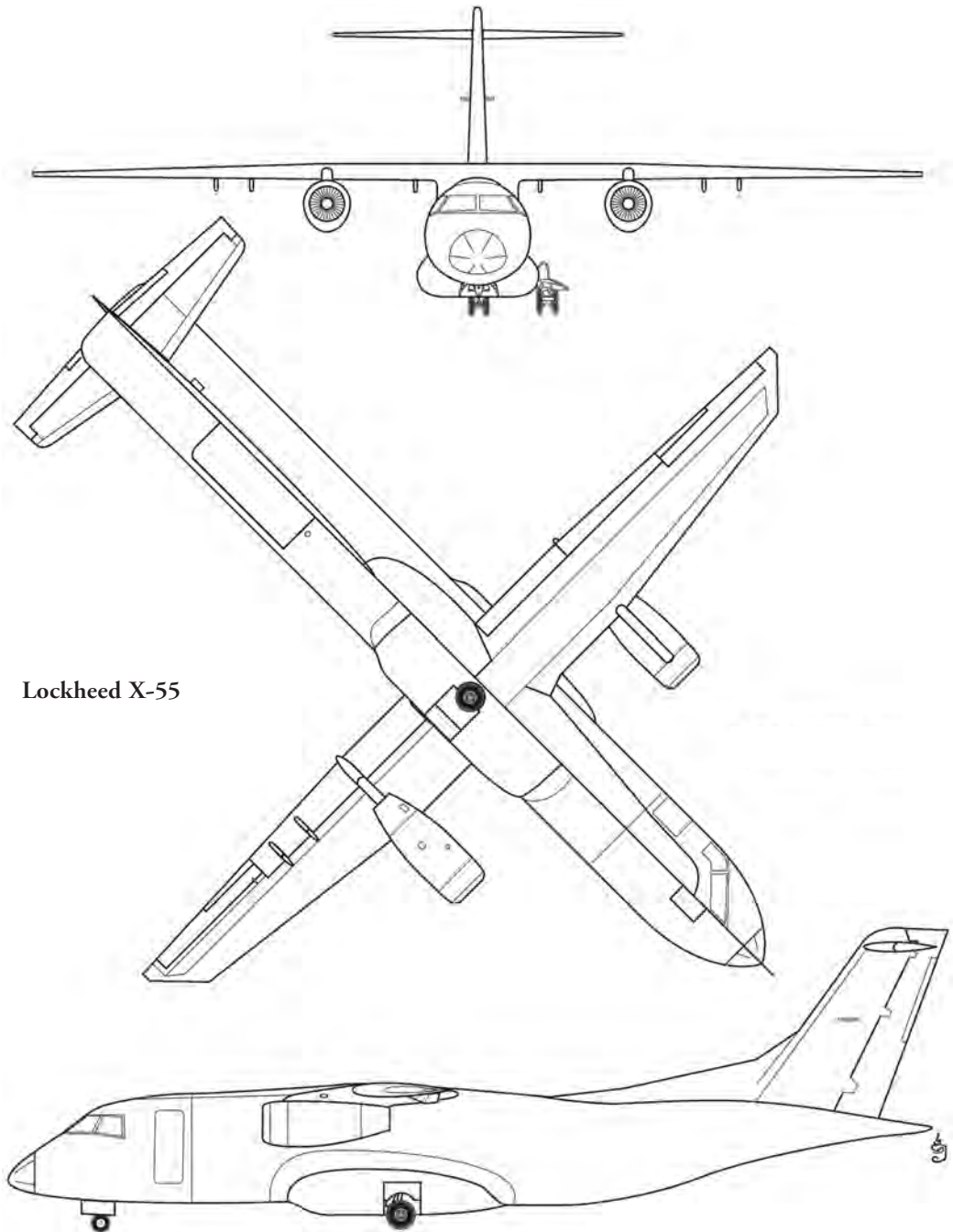
Weights (328Jet): 28,814 lbs. empty, 34,254 lbs. max. takeoff.

Dimensions: Span 68 ft. 10 in., length 55 ft., wing area (not reported).

The Lockheed Martin X-55A Advanced Cargo Composite Aircraft (ACCA) is a one-of-a-kind aircraft built to test and demonstrate the use of advanced composite materials in the airframe of a high-wing transport. The general aerodynamic design and layout is based upon the Fairchild-Dornier 328Jet, which was first flown in 2004. Construction of the X-55A, started under a



X-55A Advanced Cargo Composite Aircraft seen on first flight from Palmdale, California, in June 2009. The aircraft is apparently a proof-of-concept demonstrator with no plan to place it in production.



Lockheed X-55

USAF contract sometime in 2005 or 2006, entailed replacing the entire fuselage of the 328Jet aft of the flight deck and forward door. Resembling a very big kitplane, the fully formed composite subassemblies included upper and lower fuselage halves, cargo deck, wing fairings, vertical fin, landing gear fairings, and rear cargo ramp. As fuselage construction advanced, the wings, engine pylons and nacelles, horizontal stabilizer, and rudder of the 328Jet were re-attached. The X-55A prototype completed its first flight on June 2, 2009, and testing continues.

# Appendix: Military Transport Aircraft and Unit Designations, Nomenclature and Abbreviations

## 1. TRANSPORT AIRCRAFT

### USAAS, USAAC, USAAF, and USAF Transport Aircraft

A standardized alpha-numeric system for designating different types of Army Air Service aircraft first appeared in 1919, and with variations, a comparable system remains in effect today. When the tri-service system for all U.S. military aircraft was adopted in September 1962, it terminated the numeric sequence of preexisting USAF aircraft types and started over. The tri-service system also applied to Navy, Marine Corps, Coast Guard, and U.S. Army aircraft. Infrequent exceptions to the tri-service system, as with the C-143 and HC-144, are noted in the text. With occasional caveats, the alpha-numeric system is normally expressed in the following order: SUB-VERSION — TYPE — TYPE NUMBER — VERSION. For example, VC-47A translates to: V = VIP-Configured Sub-Version, C = Cargo Transport, -47 = Forty-Seventh Type, and A = First Version. An “X” preceding the designation generally reflects experimental status and a “Y” or “Y1” indicates a pre-production service test model. While not covering all USAAS, USAAC, USAAF, and USAF designations, the following will provide a key to the letters and numbers applicable to the specific aircraft types covered in Series I, Part A, Series II, and Series III of this book:

#### *Type Designations*

B = Bomber, Medium and Heavy  
B = Bomber, Tactical and Strategic  
C = Cargo Transport  
CV = STOL Transport  
CV = V/STOL Transport  
L = Liaison  
LC = Light Transport  
MC = V/STOL Special Operations Transport  
U = Utility

#### *Dates Used*

1924–1948  
1948–Present  
1925–Present  
1962–1967  
1989–Present  
1942–1962  
1948–1962  
1989–Present  
1953–Present

UC = Utility Transport	1943–Present
UV = Utility and Staff Transport	1972–Present
V = Staff Transport	1962–Present
T = Trainer	1948–Present

*Sub-Version Prefixes**Dates Used*

A = Attack (e.g., AC-130H)	1965–Present
C = Transport Conversion (e.g., CB-25J)	1942–Present
E = Electronics and ECM (e.g., EC-54E)	1948–Present
H = Search and Rescue (e.g., HU-16B)	1962–Present
J = Electronics Testbed (e.g., JC-121C)	1948–1962
M = Medical Evacuation (e.g., MC-119J)	1948–1962
M = Special Operations (e.g., MC-130H)	1962–Present
N = Specialized Testbed (e.g., NU-1B)	1948–Present
R = Reconnaissance (e.g., RC-12B)	1948–Present
S = Search And Rescue (e.g., SC-47D)	1948–1962
T = Trainer (e.g., TC-12B)	1948–Present
V = VIP-Configured (e.g., VC-140B)	1948–Present
W = Weather Reconnaissance (e.g., WC-130E)	1948–Present
X = Experimental (e.g., XC-112A)	1924–Present
Y = Pre-Production Service Test Model (e.g., YC-14)	1940–Present
Y1 = Service Test Production Batch (e.g., Y1C-21)	1924–1940

## Navy, Marine Corps, and Coast Guard Transport Aircraft

A standardized system for designating different types of naval aircraft first appeared in 1922 and remained in effect with minor variations until September 1962, after which a common tri-service designation system was adopted for all aircraft serving within U.S. military branches. The pre-1962 system used a combination of letters and numbers to identify particular aircraft, in the following order: TYPE – MODEL – MANUFACTURER – VERSION – SUB-VERSION. For example, R4D-5Z (corresponds to a USAF VC-47A) translates to: R = Transport, 4 = Second Model, D = Douglas Aircraft Co., -5 = Fifth Version, and Z = VIP-Configured Sub-Version. An “X” preceding the designation generally denotes experimental status. While the following does not attempt to list all naval aircraft designations, it provides a key to the letters and numbers applicable to the specific aircraft types covered in Series I, Part B, of this book:

*Type Designations**Dates Used*

G = Transport, Single-Engine	1939–1946
H = Air Ambulance	1929–1931
J = Transport	1929–1931
J = Utility	1931–1962
JR = Utility Transport	1935–1962
N = Trainer	1922–1962
P = Patrol	1922–1962
PB = Patrol-Bomber	1935–1962
R = Transport	1931–1962
SN = Advanced Trainer	1939–1962
T = Transport	1926–1930
TB = Torpedo-Bomber	1935–1946

*Sub-Versions Suffixes**Dates Used*

E = Electronics and ECM (e.g., R4D-5E)	1946–1962
G = Coast Guard Equipped Version (e.g., UF-1G)	1946–1962

L = Cold Weather Equipment (e.g., R4D-5L)	1946–1962
N = Specialized Testbed (e.g., R4D-5N)	1946–1962
P = Photographic Equipment (e.g., R5D-3P)	1946–1962
Q = Electronics and ECM (e.g., R4D-5Q)	1946–1962
R = Transport (e.g., PB2Y-3R)	1942–1962
R = Personnel Transport (e.g., R5D-4R)	1946–1962
S = Antisubmarine Warfare (e.g., R4D-6S)	1946–1962
T = Trainer (e.g., R4D-8T)	1946–1962
X = Experimental (e.g., XR2Y-1)	1927–Present
Z = VIP-Configured (e.g., P2V-3Z)	1946–1962

*Manufacturer Identifier**Dates Used*

A = Atlantic Aircraft Div. of Fokker	1927–1932
B = Beech Aircraft Co.	1937–1962
B = Edward G. Budd Mfg. Co.	1943–1946
C = Curtiss Aeroplane & Motor Co.	1925–1931
C = Curtiss-Wright Corp.	1932–1956
C = Cessna Aircraft Co.	1942–1946
C = De Havilland of Canada (Canadair)	1955–1962
D = Douglas Aircraft Co.	1925–1962
E = Bellanca Aircraft Corp.	1932–1942
F = Grumman Aircraft Engr. Corp.	1931–1962
H = Howard Aircraft Corp.	1941–1946
K = Fairchild Engine & Aircraft Corp.	1936–1946
K = Kinner Airplane & Motor Corp.	1936–1942
L = Columbia Aircraft Corp.	1942–1948
M = Glenn L. Martin Co.	1925–1962
O = Lockheed Aircraft Corp.	1931–1949
Q = Fairchild Aircraft Mfg. Co.	1928–1935
Q = Stinson Aircraft Corp.	1934–1941
Q = Fairchild Engine & Aircraft Corp.	1949–1962
R = Stout Div. of Ford Motor Co.	1928–1937
S = Sikorsky Aviation Div. of United Aircraft Corp.	1927–1946
T = Northrop Corp.	1933–1937
V = Lockheed Aircraft Corp.	1949–1962
Y = Consolidated Aircraft Corp. (later Convair)	1926–1962

## U.S. Army Transport Aircraft

Initially, from mid-1947, the Army applied previous AAF/USAF designations to its aircraft (e.g., L-5, L-17, etc.), and then in 1956 adopted a new system that applied to some but not all aircraft. The designator AC for “Aircraft-Cargo” was applied to only one aircraft reported in Series II, the De Havilland AC-1 (C-7) Caribou. After adoption of the tri-service system in 1962, the Army applied the designator CV for “STOL Transport” to two aircraft, the De Havilland AC-1 Caribou becoming the CV-2 and the De Havilland Buffalo the CV-3; however, when both types were transferred to the USAF in 1967 they became the C-7 and C-8, respectively. Application of the U for “Utility” designation to the De Havilland U-1 Otter in 1953 was unique until the designation was adopted for other aircraft types in 1962 (e.g., Cessna L-27 re-designated U-3).



## 2. AIR TRANSPORT UNITS

### USAAC, USAAF, and USAF Air Transport Units

Since World War I, the U.S. Army Air Service (USAAS), the U.S. Army Air Corps (USAAC), U.S. Army Air Forces (USAAF), and U.S. Air Force (USAF) have all used a simple system of numbers followed by acronyms to abbreviate types of aviation units. Historically, the most common unit classifications have been Divisions, Wings, Groups, and Squadrons. Groups formed the basic organizational element of most transport units until 1947, when the newly established USAF began creating operational wings, although many preexisting groups retained their unit identities within the new wing structure. Divisions are typically variegated organizations that control a mixture of operational wings (e.g., tactical fighter, tactical airlift, etc.) plus maintenance and administrative functions, whereas, post-war operational air wings are typically self-supporting entities which have a specified mission activity at an assigned base. The following lists the unit acronyms that appear in Series I, Part A, Series II, and Series III of this book:

<i>Acronym</i>	<i>Description</i>	<i>Dates Used</i>
AAFFC	Army Air Forces Ferrying Command	1942–1942
AAFFW	Army Air Forces Ferrying Wing	1942–1944
ACFC	Air Corps Ferrying Command	1941–1942
ACG	Air Commando Group	1944–1968
ACS	Air Commando Squadron	1963–1968
ACW	Air Commando Wing	1963–1968
AD	Air Division	1947–1992
AD	Airlift Division	1966–1992
AEG	Aeromedical Evacuation Group	1951–1992
AES	Aeromedical Evacuation Squadron	1951–Present
AF	Air Force (numbered, e.g. 10th AF)	1942–Present
AFRES	Air Force Reserve	1947–Present
AFSOC	Air Force Special Operations Command	1990–Present
AG	Airlift Group	1966–Present
AMAW	Aeromedical Airlift Wing	1965–1990
AMAS	Aeromedical Airlift Squadron	1965–1990
AMC	Air Mobility Command	1992–Present
AMTS	Aeromedical Transport Squadron	1948–1965
AMW	Air Mobility Wing	1992–Present
AMTW	Aeromedical Transport Wing	1948–1965
ANG	Air National Guard	1947–Present
ARG	Air Refueling Group	1951–Present
ARS	Air Refueling Squadron	1951–Present
ARRW	Aerospace Rescue and Recovery Wing	1969–1988
ARW	Air Refueling Wing	1951–Present
ASC	Air Service Command	1941–1946
ATC	Air Transport Command	1942–1946
ATG	Air Transport Group	1932–1966
ATS	Air Transport Squadron	1932–1966
ATW	Air Transport Wing	1942–1966
AW	Airlift Wing	1966–Present
AS	Airlift Squadron	1966–Present
CCG	Combat Cargo Group	1944–1948
CCS	Combat Cargo Squadron	1944–1948
CRW	Contingency Response Wing	2003–Present

EMTF	Expeditionary Mobility Task Force	2003–Present
FEAF	Far East Air Forces	1941–1957
FEAFCCC	FEAF Combat Cargo Command	1951–1957
MAC	Military Airlift Command	1966–1992
MATS	Military Air Transport Service	1948–1965
PACAF	Pacific Air Forces	1957–Present
SAC	Strategic Air Command	1946–1992
SOCOM	Special Operations Command	1987–Present
SOW	Special Operations Wing	1968–Present
SOG	Special Operations Group	1968–Present
SOS	Special Operations Squadron	1968–Present
TAC	Tactical Air Command	1946–1992
TAW	Tactical Airlift Wing	1967–1992
TAG	Tactical Airlift Group	1967–1992
TAS	Tactical Airlift Squadron	1967–1992
TCC	Troop Carrier Command	1942–1946
TCG	Troop Carrier Group	1942–1967
TCS	Troop Carrier Squadron	1942–1967
TCS(H)	Troop Carrier Squadron (Heavy)	1947–1958
TCS(M)	Troop Carrier Squadron (Medium)	1947–1958
TCW	Troop Carrier Wing	1942–1967
USAFE	U.S. Air Forces Europe	1945–Present
USAFSC	U.S. Air Forces Southern Command	1963–1976
USAFSAD	U.S. Air Forces Southern Air Division	1976–1989
USSOCOM	U.S. Special Operations Command	1987–Present

## Navy, Marine Corps, and Coast Guard Air Transport Units

Squadrons have formed the basic organizational component for both Navy and Marine aviation units since the post-World War I era. Standard nomenclature for aviation squadrons was first adopted by the Navy Department in 1920, and with variations, the same system is still in use today. Using a scheme analogous to aircraft, squadrons have been identified by a combination of letters and a number, i.e.: AIRCRAFT CATEGORY—MISSION—SECONDARY OR SPECIAL MISSION (when applicable)—SQUADRON NUMBER. Thus, VRC-30 translates to: V = Heavier-Than-Air, Fixed-Wing, R = Transport, C = Tactical Support, and -30 = Squadron Number Thirty. Since 1924 Marine Corps squadrons have been distinguished by the letter “M,” initially as a suffix (e.g., VJ-7M), but after 1937, as part of the prefix (e.g., VMJ-152). With the exception of patrol squadrons formed during World War II, Coast Guard aircraft, including transport types, have customarily been assigned to various air stations (CGAS). The following lists the unit acronyms that appear in Series I, Part B,

Series II, and Series III of this book:

<i>Acronym</i>	<i>Description</i>	<i>Dates Used</i>
BAD	Base Air Detachment	1941–1946
DET	Detachment (of a squadron)	1946–Present
CFLS	Carrier Fleet Logistics Support	1977–Present
COD	Carrier Onboard Delivery	1950–Present
CVG	Carrier Air Group	1942–1963
CVW	Carrier Air Wing	1963–Present
FLS	Fleet Logistics Support	1948–Present
FLSW	Fleet Logistics Support Wing	1948–Present
FRS	Fleet Replacement Squadron	1980–Present

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FTS	Fleet Tactical Support	1966–1977
HEDRON	Headquarters Squadron (USMC)	1943–1964
MAG	Marine Air Group	1940–Present
MAW	Marine Air Wing	1941–Present
NAFC	Naval Air Ferry Command	1943–1946
NALO	Navy Air Logistics Office (Reserve)	1977–Present
NATS	Naval Air Transport Service	1941–1948
TTS	Transitional Training Squadron	1941–1946
VJ	Utility Squadron	1927–1942
VMJ	Marine Utility Squadron	1927–1944
VMR	Marine Transport Squadron	1944–1962
VMGR	Marine Aerial Refueler Transport Squadron	1962–Present
VMGRT	Marine Aerial Refueler Transport Training Squadron	1962–Present
VMM	Marine Tiltrotor Transport Squadron	2005–Present
VMMT	Marine Tiltrotor Training Squadron	2000–Present
VMX	Marine Tiltrotor Test Squadron	2005–Present
VR	Transport Squadron	1942–1948
VR	Fleet Logistics Support Squadron	1948–Present
VRC	Fleet Tactical Support Squadron	1966–1977
VRC	Carrier Fleet Logistics Support	1977–Present
VRF	Ferry Transport Squadron	1942–1946
VRU	Utility Transport Squadron	1946–1948
VX	Experimental and Test Squadron	1927–Present

# Glossary

- AERODYNAMIC FORCE** — A term pertaining to the motion of the air as it acts upon a body (i.e., an aircraft) which is in motion against it.
- AERODYNAMIC LIFT** — The upward force, perpendicular to the direction of travel, produced by the camber of a wing moving through the air.
- AFTERBODY** — The section of a flying boat or amphibian hull aft of the step.
- AILERONS** — Moveable control surfaces on the trailing edge of each wing, which, working in opposition, control the rotational motion of aircraft about its longitudinal axis.
- AIRFOIL** — The shape of a wing or flying surface as seen in cross-section, sometimes referred to as an airfoil section. Airfoils are designed to produce lift, or in the case of propellers, thrust.
- AIRSPEED** — The measurement of an aircraft's velocity.
- ALCLAD** — A trademark used by Alcoa Aluminum Company for a high-strength sheet of aluminum consisting of an aluminum alloy core having one or both surfaces metallurgically bonded with a pure aluminum that is electrochemically resistant to corrosion.
- ALTITUDE** — The height of an aircraft above the ground or water, usually measured in feet.
- AMIDSHIPS** — The section of a ship or flying boat halfway between the bow and stern.
- AMPHIBIAN** — As used in this book, an amphibian refers to an aircraft having a boat-type hull or a pontoon forming a permanent part of the fuselage and is equipped with retractable landing gear that permits land operations.
- ANGLE-OF-ATTACK (AOA)** — The angle formed by the chord of an airfoil and the direction of the aircraft into the relative wind.
- ANGLE OF INCIDENCE** — The angle between the chord line of a wing or horizontal stabilizer and the aircraft's longitudinal axis.
- ANTISUBMARINE WARFARE (ASW)** — A branch of warfare using ships or aircraft to detect, track, and/or destroy hostile submarines.
- ARMAMENT** — Refers to any type of weapon carried by an aircraft, including, machine guns and cannons, bombs, torpedoes, depth charges, and mines.
- ASPECT RATIO** — The ratio between the span and the chord width of an aircraft's wing. A high aspect ratio wing is typically long and narrow, while a low aspect ratio wing is short and wide. Aspect ratio is usually expressed as the square of the wingspan divided by total wing area, for example a Douglas C-47, with a wingspan of 95 feet six inches and wing area of 987 square feet, has an aspect ratio of  $9.2 [(95.5)^2 \div 987]$ .
- BALANCED CONTROL SURFACE** — A moveable control surface, such as an aileron or elevator, which incorporates a weight forward of the hinge point to reduce control forces on the stick or yoke.

- BIPLANE** — An aircraft having two wings, an upper and lower. Some early aircraft also featured a biplane horizontal stabilizer and elevator.
- BLEED AIR** — Air at high pressure, usually produced by a gas turbine engine, used for anti-icing, heating, or boundary-layer control.
- BLOWN FLAPS** — A flap system which uses either engine thrust or a boundary-layer control system (see, below) to force air across the flaps.
- BOUNDARY-LAYER CONTROL (BLC)** — A system in which high-pressure air generated by a gas turbine engine (i.e., bleed air) is forced over the wing or part of a wing to prevent the separation of airflow at lower airspeeds.
- CABANE STRUT** — Struts used on a biplane, triplane, or parasol monoplane to attach the wings to the fuselage or hull.
- CAMBER** — The curvature of the upper and lower surfaces of an airfoil.
- CANTILEVERED** — An aircraft wing or flying surface wholly supported by its internal structure without need for external bracing.
- CEILING** — The maximum height above sea level, normally measured in feet, attainable by aircraft under standard atmospheric conditions.
- CENTER OF GRAVITY (CG)** — The lateral and longitudinal point at which an aircraft balances.
- CENTER OF PRESSURE** — The aerodynamic point of a wing where the pitching moment (i.e., tendency to pitch nose up or nose down) is constant with the angle-of-attack.
- CHORD** — The distance between the leading and trailing edges of a wing. In the case of a tapered or elliptical wing, the distance is expressed as the mean aerodynamic chord. The term is also used in reference to tail surfaces, control surfaces, and flaps.
- CONSTANT-SPEED PROPELLER** — An electrically or hydraulically controlled propeller equipped with a governor that automatically changes pitch to maintain a constant RPM in response to changes in power settings.
- CONVENTIONAL LANDING GEAR** — A configuration having the two main landing wheels located in front of the CG and a tailwheel or skid at the rear. Popularly known today as a “tail-dragger.”
- COWLING** — A removable fairing around an aircraft engine that improves streamlining and cooling.
- COWL FLAP** — A moveable flap, usually located at the rear of an engine cowling, that regulates the flow of air through the cowling.
- DIHEDRAL** — An upward angle of the wings or horizontal flying surfaces in relation to the horizontal cross-section of the aircraft.
- DORSAL** — A location on the upper section of a fuselage as in a dorsal fin.
- DRAW** — The resistance caused by the motion of an aircraft through the air. There are generally two forms of drag: (1) parasite drag caused by the friction of the outer surfaces of aircraft; and (2) induced drag generated by the lift of the wing and other flying surfaces.
- DRAW RING** — A cambered ring encircling the cylinders of a radial engine for the purpose of improving streamlining and cooling. Also known as a cowl or speed ring.
- DRAW WIRE** — A rigging wire in an aircraft’s structure designed to resist forward and backward aerodynamic loads.
- DURAL** — Originally a trade name, now used generically, for any wrought aluminum containing alloys of copper, magnesium, and manganese. Also known under the Alcoa trade name “Duraluminum.”
- ELEVATOR** — A moveable surface at the rear of a horizontal stabilizer controlling the pitch (nose up or nose down) of an aircraft around its lateral axis.
- EMPENNAGE** — The tail group of an aircraft, including the vertical stabilizer and rudder, horizontal stabilizer and elevator, and any supporting structures.



**EMPTY WEIGHT** — The weight of an aircraft less crew, passengers, cargo, baggage, armament (if military), and usable fuel.

**FAIRING** — A non-structural component added to the outside of an aircraft to reduce drag.

**FEDERAL AVIATION ADMINISTRATION (FAA)** — An agency of the U.S. government having authority to oversee and regulate all aspects of civil aviation.

**FIN** — See, vertical stabilizer.

**FIREWALL** — A fire-resistant bulkhead between the engine compartment and the fuselage/hull or nacelles.

**FLAP** — A hinged surface on the trailing edge of the wing which changes the camber in order to increase lift and drag. The lowering of flaps has the effect of lowering stall speeds, decreasing angle-of-attack, and causing the aircraft to fly more slowly. The most common types of flap systems are:

1. **SPLIT** — A flap consisting of a plate hinged from the bottom surface of the wing.
2. **PLAIN** — A flap consisting of a hinged section of the entire trailing edge of the wing.
3. **SLOTTED** — A flap in the shape of an airfoil which, when lowered, is positioned to form a slot between the wing and the leading edge of the flap.
4. **FOWLER TYPE** — A slotted flap, named for engineer Harland D. Fowler, that moves both rearward and downward on a track, thereby increasing camber and effective wing area.

**FLAPERON** — A hinged surface on the trailing edge of a wing that is interconnected to function as both a flap and an aileron.

**FLYING BOAT** — An aircraft having a boat-type hull that possesses no type of landing gear, retractable or detachable, for land operations. Some flying boats may be equipped with built-in wheels used only for beaching.

**FLYING WIRE** — A collective term for all of an aircraft's rigging wires: drag wires, landing wires, and lift wires. Early biplanes were highly dependent on flying wires to support and distribute normal aerodynamic loads.

**FORMER** — A structural or non-structural internal member of a fuselage or boathull that forms its outside shape in cross-section.

**FRISE AILERON** — A type of aileron, named after engineer Leslie G. Frise, having a beveled leading edge and mounted forward of its inset hinges. When raised, its nose produces drag and decreases adverse yaw, thus requiring less or no rudder input during a banked turn.

**FUSELAGE** — The main body of an aircraft housing the cockpit, passenger cabin and/or cargo space and to which the wings and tailplane are attached. In the case of a flying boat or amphibian, the fuselage and hull are normally integrated as one structure.

**GAS TURBINE ENGINE** — A type of internal combustion engine using a compressor driven by a turbine mounted on the same shaft. The energy produced by the combustion of the compressed air and fuel (usually kerosene) spins the turbine as the gases are expelled rearward.

**GROSS WEIGHT** — The design weight of an aircraft when fully loaded with fuel, crew, passengers, cargo, and armaments. The term is sometimes expressed as normal gross, the weight at which the aircraft remains within its airframe operating limitations, and maximum takeoff, which contemplates that the aircraft will reach normal gross following a predictable fuel burn-off.

**GROUND EFFECT** — A phenomenon caused by the interaction of lift produced by the wing near the ground when the aircraft is approximately a wingspan distance above it.

**HORIZONTAL STABILIZER** — The fixed portion of the horizontal tailplane to which the elevator is attached.

**HORIZONTALLY OPPOSED ENGINE** — A type of reciprocating piston engine in which an even number of cylinders (2-4-6-8) are arranged on either side of the crankcase. Most horizontally opposed aircraft engines are air-cooled.

**HORSEPOWER (hp)** — A measure of the motive energy required to raise 550 lbs. to a height of one foot in one second.

**INLINE ENGINE** — A type of reciprocating piston engine in which an even (4-6-8-12) number of cylinders are arranged either in a straight line or in a V-type configuration directly above (or below) the crankcase. Most early inline aircraft engines were water-cooled via a radiator system, though air-cooled types began to appear during the 1930s.

**INTERPLANE STRUT** — One or more pairs of vertical (or nearly vertical) biplane struts, located outside of the cabanes, which transmit aerodynamic loads between wing panels and maintain angles of incidence. Some interplane struts, known as 'N' struts, feature an additional drag strut between them.

**LEADING EDGE** — The forward most part of an aircraft's wing or flying surfaces.

**LIGHTPLANE** — A generic term for a single or multi-engine aircraft having a gross weight of 6,500 lbs. or less and most commonly applied to civil aircraft.

**LOAD FACTOR (G)** — A measurement of the force acting upon an aircraft due to acceleration or gravity, usually expressed in units of G times one.

**MACH** — A measurement of velocity in ratio to the speed of sound (e.g. 761.6-mph at sea level), usually expressed as a fraction (e.g., 0.85 Mach = 650-mph at sea level).

**MONOCOQUE** — A type of fuselage or hull design in which most of the structural and aerodynamic loads are carried by the outer skin rather than internal bracing.

**MONOPLANE** — A aircraft having one set of wing surfaces, mounted in various configurations as low-wing, mid-wing, shoulder-wing, high-wing, or parasol-wing.

**NACELLE** — A streamlined structure used to house engines, landing gear, weapons, or in some instances, a cockpit or cabin

**NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS (NACA)** — A U.S. government agency established in 1915 to carry out and make available various forms of aeronautical research. Aerodynamic forms tested and developed by the agency, such as airfoils and cowlings, are known by NACA number or type.

**PAYLOAD** — The proportion of an aircraft's useful load over and above fuel and required crew.

**PITCH** — The nose up and down motion of an aircraft about its lateral axis.

**PLANFORM** — The general arrangement of an aircraft as seen directly from above or below.

**PORT** — The left side of an aircraft or, facing forward, the direction to the left of it.

**POWER-TO-WEIGHT RATIO** — For the aircraft, the rated horsepower or thrust divided by the gross weight; for the powerplant only, the rated horsepower or thrust divided by the weight of the engine and accessories.

**PROPELLER PITCH** — The angle of a propeller blade in relation to its rotational arc; also, the measurement of the forward distance advanced by a propeller blade in one full arc of rotation.

**PUSHER** — An engine mounted with its propeller facing aft.

**PYLON** — A streamlined structural member supporting a wing, tailplane, or engine.

**RADAR (Radio Detection and Ranging)** — An electronic system that uses electromagnetic waves to identify the range, altitude, direction, and speed of moving or stationary objects such as aircraft, ships, weather features, or terrain.

**RADIAL ENGINE** — A type of reciprocating piston engine in which the cylinders are arranged around the crankcase like the spokes on a wheel. An odd number (5-7-9) of pistons are connected to the crankshaft via a master-and-articulating-rod assembly.

**ROLL** — The rotational motion of an aircraft about its longitudinal axis.

**RUDDER** — A moveable surface at the rear of a vertical stabilizer controlling the yaw (nose left or nose right) of an aircraft about its vertical axis.

**SEAPLANE** — A generic term for any aircraft capable of taking off from and landing on the water.

**SEMI-CANTILEVERED** — An aircraft wing or flying surface supported partly by internal structure and partly by external bracing.

- SEMI-MONOCOCQUE — A type of fuselage, hull, or nacelle construction where the outside skin is supported by internal formers and stringers that share the structural, hydrodynamic, and aerodynamic loads. It is the most common method used in the fabrication of fuselages and hulls from aluminum.
- SESSQUIPLANE — A biplane configuration in which the lower wing possesses much less area than the upper wing.
- SHAFT HORSEPOWER (shp) — The amount of horsepower delivered to a propeller shaft, corrected for the loss of power caused by a transmission or drive system. Commonly used as a measurement of power in turboprop engines.
- SLAT — A moveable surface on the leading edge of a wing which increases both camber and airflow. Slats can be manual or designed to automatically extend at higher angles-of-attack.
- SLOT — A spanwise gap in the leading edge of a wing which increases airflow over the upper surface at higher angles-of-attack.
- SPAR — The main structural member of an aircraft wing or flying surface running perpendicular to or across its longitudinal axis. Spars are typically designed to resist any structural or aerodynamic loads, i.e., lift, landing, drag, and torsion.
- SPOILER — A moveable plate on the upper surface of a wing for the purpose of causing drag or, when used differentially, to induce roll.
- STAGGER — The relative fore and aft relationship between the leading edges of the upper and lower wings of a biplane. If the leading edge of the upper wing is forward of that of the lower wing, the aircraft is said to have “positive” stagger. The reverse is true for “negative” stagger.
- STALL — An event that causes the wing to lose lift to the extent that it will no longer support the weight of the aircraft. A stall is caused by an increase in angle-of-attack and resulting loss of airspeed. An “accelerated” stall occurs when the aircraft reaches critical angle-of-attack while accelerating in excess of one-G.
- STARBOARD — The right side of an aircraft or, facing forward, the direction to the right of it.
- SWEEPBACK — The rearward angle between the quarter chord line (i.e., the distance between the leading and trailing edges) of an aircraft’s wing and its longitudinal centerline.
- TAILPLANE — See, empennage, above.
- TAPER — The angle of a wing or tail surface from root to tip as measured from its leading and/or trailing edge.
- THRUST — An aerodynamic force propelling an aircraft through the air. Thrust may be produced by a propeller or by the expelled gases of a jet or rocket engine. In principle, thrust must exceed drag (aerodynamic and hydrodynamic) in order for an aircraft to achieve flight, and in a level, cruising attitude, thrust and drag are equal.
- TORQUE — The rotational force imparted by a turning propeller which causes an aircraft to rotate in the opposite direction, thereby inducing roll and yaw.
- TRACTOR — An engine mounted with its propeller facing forward.
- TRAILING EDGE — The rear most part of an aircraft’s wing or flying surfaces.
- TRICYCLE LANDING GEAR — A configuration having the two main landing wheels located aft of the CG and a nosewheel mounted to the front.
- TRIM TAB — A small, adjustable or fixed control surface located on or within the trailing edge of a rudder, elevator, or aileron. Adjustable trim tabs, controlled from the cockpit, are used to reduce the aerodynamic forces imposed on flight controls; fixed trim tabs are adjusted on the ground to enable the aircraft to maintain trim in level flight.
- TURBOFAN ENGINE — A type of gas turbine engine (see above) in which thrust is produced in combination with a ducted fan connected to the axial shaft, forward of the compressor, and by expelling exhaust cases rearward. Turbofans are generally of two types: (a) high-bypass in which the thrust from the fan is ducted outside the compressor and turbine nacelle and (b) low-bypass in which it is ducted within a common nacelle.

- TURBOJET ENGINE** — A type of gas turbine engine in which thrust is produced solely by expelling exhaust gases rearward.
- TURBOPROP ENGINE** — A type of gas turbine engine in which thrust is produced by a propeller connected to the axial shaft through a driveshaft and transmission case.
- TYPE CERTIFICATE** — A certificate of airworthiness issued by the CAA or FAA (since 1958) for an aircraft which meets the criteria for Standard Category. The Type Certificate indicates that the aircraft, its powerplant, and related systems, have fulfilled all the requirements for conduct of safe flight operations under all normally conceivable conditions. Any manufactured, ready-to-fly aircraft must possess a Type Certificate. A Type Certificate issued for a particular aircraft will remain valid as long as the aircraft meets its approved type design.
- USEFUL LOAD** — The added weight of an aircraft's fuel, crew, passengers, baggage, cargo, and armaments (if military). Armament (i.e., weapons load) may be considered separately.
- UTILITY AMPHIBIAN** — A type of single and multi-engine amphibian used by all U.S. military branches from 1923 for ship-to shore transportation, search and rescue, and, occasionally, coastal maritime patrol.
- VARIABLE PITCH PROPELLER** — A hydraulically or mechanically controlled two-position propeller that can be varied from high RPM for takeoff and climb to low RPM for level flight and cruise.
- VERTICAL STABILIZER** — The fixed portion of the vertical tailplane to which the rudder is attached.
- WASH-OUT** — A feature of wing design in which a slight amount of 'twist' (as seen from the side) reduces angle of incidence from root to tip. For reasons of stability, an amount of washout is normally incorporated to insure that the wing stalls at the root (which has a higher angle-of-attack) before reaching the tip. Wash-in, rarely ever seen, is the opposite of wash-out.
- WING LOADING** — The wing area of an aircraft divided by its gross weight, usually expressed in pounds per square foot.
- WING RIB** — A chordwise member of a wing structure that forms its airfoil shape and transmits aerodynamic loads from the skin to the spars. Wing ribs may be fabricated from wood, aluminum, or composite material.
- YAW** — The side-to-side motion of an aircraft about its vertical axis.

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